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LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

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EDITORIAL NOTES.

The Only Way.

"FULL steam ahead" is the state of affairs in some colliery areas, and in others there are indications of a return to life. These stand in strange contrast to the condition of affairs at the headquarters of the Miners' Federation, where gloom reigns, through a full recognition that the egregious bungling and incompetence of the leaders this year have come to an end, accompanied by a divestment of power. As a matter of fact, the Federation no longer counts in the mining industry. It has had its day, and a tragic one it has been for all concerned. Less is heard now of the egotist of the Federation; report says he is about to go on a visit to his Soviet friends, and they are at liberty to keep him. The bombast of the past few months has died away; and the day of posing in the rôle of dictators has gone. The Executive of the Federation have had to cave-in ignominiously; and now the work of settling up the horrible mess is to be transferred from London to the districts, where the position should have been dealt with in the spring.

It was last Friday that saw the vanishing of the remnant of authority from the hands of the Federation Executive. The district delegates met the latter that day, and found them again without any policy or the inclination to make any recommendation. Things had come to such a pass that no one wanted to shoulder the responsibility for doing anything. Perhaps it was a good thing the Executive did not feel like making recommendations; their essays in that direction in the past have proved ruinous for all who have been in any way mixed up with them. It was stated that discussions, behind closed doors, were long and acrimonious; and those present did not hesitate to give free expression to their kindly thoughts of each other—not that, in the circumstances, much good can come of recrimination, but perhaps it is as well that men of the type of those constituting the Federation Executive should hear the truths that are in circulation within their own camp. It is plain that everybody, excepting the minority following of Cook, is utterly sick of the whole business; but they cannot be more sick of it than the community who have, like the miners and the mining industry, been the victims of crass folly. The resolution that was passed on Friday was to the effect that the conference, having considered the whole of the circumstances, recommends all districts to open up negotiations with the coal owners with the view of arriving at agreements. The Executive were also asked to define the general principles which should guide the district organizations in their negotiations; and a third clause was deliberately framed with the object of leaving the Federation Executive in final charge. It prohibits any district entering into a complete settlement until a further national conference is held to receive the reports of all negotiations. But the Federation know full well that the owners will definitely refuse to meet representatives of the men regarding district settlements, unless there is absolute assurance that they have plenary power to negotiate terms, and give effect to decisions, without submitting them to a national body for confirmation or otherwise. As a matter of fact, the local leaders are on the horns of a dilemma in this regard, with so many men at work, and others flocking back daily, with a total disregard of their leaders, and working on terms to which they have themselves agreed. On Friday there were no less than 376,374 men back at work, out of 1,107,128 normally employed before the stoppage; and probably the number already working represents about half those who will be required for some time to come. The leaders will have a little reckoning to settle with the 200,000 or 300,000 men whose services are not likely to be required through the shrinkage in the demand for our coal. However, the local leaders will have to fix up agreements with the owners, or see the flow back to work accelerated on the terms offered by the latter; they will have to meet the wish of the owners for a district agreement pure and simple, without any reference to the bungling men at the Federation headquarters. The instruction that no local agreements are to be effected before a further conference is held was as good as a dead-letter before the ink was dry which placed it on record. Already in Nottinghamshire, negotiations by Mr. G. A. Spencer, M.P., and his colleagues—under the authority of the men at work, and disregarding the old District Association—have resulted in an agreement which will become operative from to-day.

A noticeable thing is that the delegate conference on Friday made no point of the "results" of the foolish "vote" which was supposed to have been taken in the districts on the final proposals of the Government. The Federation have too often tried to palm off on the country silly fiction dressed up as fact; but time and again the dress has been too gossamer for any effective deception. The torrent of ridicule to which the manner of taking this last vote has been subjected was sufficient to prevent the Federation Executive and the district delegates from seriously putting forward the figures, or adopting them as an instruction respecting the course they should take. They knew better than anybody else that the figures had no intrinsic value. According to the sham voting, there were against acceptance of the Government proposals 460,806, and in favour 313,200—a majority against of 147,606. What is known as the block principle of voting was almost generally adopted. Meetings were held, and the majority of the votes of those present was taken to represent the views of the men in the area. The absurdity of this is seen from the fact that many of the meetings were held while (taking Friday's returns) 376,374 men were at work. If we add this number to the 313,200 in favour of the Government proposals, we have 689,574, or 228,768 in excess of the 460,806 votes against acceptance. Once more folly has been exposed; and the delegates at the conference knew the nature of public opinion upon this fictitious vote, which wasted another week.

The "general principles" on which the Federation Executive wish the District Associations to proceed in making regional agreements provide: (1) That ascertainments of the district wage percentage shall be on the basis

of the 1921 national agreement. (2) The ratio of the division of proceeds to be 87 to wages and 13 to profits. The Government proposed 87 :13 or 85 :15. (3) The minimum percentage to be not less than 20 p.ct. on the standard wages prevailing on April 30 last. (4) Payment of April subsistence wages to the lower paid day-wage men. The owners are not likely to depart from their recent declaration that they cannot see their way to pay the same subsistence wages in every district. Also they will probably not see eye to eye with the Federation Executive in their attempt to pave the way for another early upheaval, as provided for in general principle (5) : " All agreements to be terminated by one month's notice on either side." The owners will probably remove any uncertainty in this regard. The next " principle " is superfluous. (6) Districts to endeavour to effect the complete reinstatement of all men and boys employed on April 30. The leaders know full well that only as many will return as there is work for. The leaders having brought about the destruction of trade which will necessitate probably a quarter of a million men being unemployed, they should make provision for keeping the men until work can be found for them elsewhere.

However, the Government terms having been rejected by the miners, they are again out of the picture, and no legislation will be put forward to set up a national tribunal to review matters affecting district settlements. Neither side really wanted such a tribunal. The Miners' Federation are particularly anxious to retain a finger in the pie, and not remain as outsiders. But their own methods this year have been effective in stripping them of all authority. The country has had enough of them; we believe the other trade unions of the country are of the same way of thinking; and it is hoped the views of the miners coincide, having regard to the tragic state to which wretched leadership has brought them.

Auxiliary Developments.

MEN of good business acumen in charge of large manufacturing and trading establishments constantly keep their eyes open for promising auxiliary business which will help development and promote the diversity in which there is added safety. In the gas industry we have great diversity of business, but every line of it is subjected to competition. That we do not mind; but the competition means that all business secured by the competitor is so much less for the gas industry. Despite electrical competition we are doing extraordinarily well in the sale of gas. Tar for road purposes has now to compete with bitumen; bye-product sulphate of ammonia has had its market value depreciated by the synthetic product, which has brought about a big change in the balance of supply and demand. These are matters which have to be watched very carefully. Then again, no effort is being spared to get the low-temperature system of carbonization established, so as to produce a coke which (the promoters trust) will have a better demand through greater appreciation than high-temperature coke, though the gas industry is hoping that an improvement in the ash content of coal and the production of a coke of the right physical qualities will prove as efficient for domestic purposes as a coke containing a larger percentage of volatile matter. United with this question is that of the production of a larger quantity of oil and motor spirits at home, when the natural products become scarcer, and values higher. Then there is the use of pulverized fuel; and pulverized low-temperature coke is being strongly advocated. The gas industry cannot stop other industries from developing pulverized fuel firing; and there is no question that the demand for such fuel is a growing one.

In the " JOURNAL " last week an editorial note on the subject of low-temperature carbonization suggested that —though the system does not appeal to the gas industry at the moment because, as a commercial proposition, there is nothing sufficiently definite about it—it will be well to keep an eye upon it, inasmuch as, should circumstances change, it might be an advantage to link it up to the present work of the industry for the development of legitimate kindred business. As business men, we must not confine ourselves to the development of trading in existing products. We have to look forward—to keep under close observation possibilities in respect of lighting and heating, the probable diminution in the supply of natural oil, the demand for solid smokeless fuel, and the increasing use of pulverized fuel. We have to consider how far, as new circumstances develop, we can supply what will be required; whether or not it will be profitable to develop auxiliary business in these or other directions, and so provide collateral expansion for the industry. Businesses have to cater for what is demanded—not what the men running them chose to supply.

However, the point we wish to make is only advisory in so far as the suggestion goes that the industry should maintain a strict watch over current movements, and should consider (and not dismiss summarily) whether or not it would be beneficial for it to enter, when opportunity is ripe, into auxiliary developments of a cognate order. Better consideration and appreciation will be possible if we get well into our minds that gas undertakings are vendors of light, heat, and power—not merely of the primary gas and coke. It is highly interesting to indulge in a survey to see how a gas undertaking can legitimately extend its trading boundaries, and to investigate the means of doing so. As we remarked last week, we lost electricity supply when it might have been united with economic advantage to the gas industry; history must not repeat itself in other directions through neglect of adequate exploration, but only through conclusive evidence of the impropriety of opening up the new ground.

Clean Coal, Electricity Supply, and Minimum Dividends.

WORK tackled, and work to be done, were the components of the report of the Committee, and supplied the material for the speech of the Vice-Chairman (Mr. R. W. Edwards), at the annual meeting of the Gas Companies' Protection Association on Tuesday last week. In the activities of the year, the Chairman (Dr. Charles Carpenter) has taken foremost part; and there was general regret that indisposition prevented him from being present at the meeting to address the members, as independent thought and critical survey are what one always expects and obtains from him on these occasions. It would have been highly interesting to have had from him at this time his views on many of the topics the Association have been concerned in during the year, as well as on the situation of the gas industry in respect of the lamentable occurrences which have marred the year.

We all remember well and gratefully Dr. Carpenter's cogent evidence before the Royal Commission on the Mining Industry, which, with other testimony from the gas industry, unquestionably had effect upon certain parts of the report and recommendations of that body, and will, it is believed, have more material effect still in developments in which our industry will have participation. There were two principal points in Dr. Carpenter's evidence—one the appeal for cleaner coal, and the need for the encouragement of the gas industry to undertake the production of suitable coke as a substitute for raw coal, especially for domestic purposes. To no small extent, the two things hang together—for if cleaner coal can be procured, a coke of less ash content will be obtained, whatever the system of carbonization. Mr. Edwards, in his address, was peculiarly interesting in this regard. Throughout the industry his hope will be endorsed that, when the coal industry gets into proper stride again, a serious endeavour will be made to limit the ash content of coal. The gas industry will press this matter again and again until good results, to the promotion of national economy and efficiency. Mr. Edwards instanced a gas company who had made contracts containing a clause which adopts a datum line of 6 p.ct. for ash. In the event of the coal containing over 7 p.ct. and not more than 10 p.ct. of ash, the sellers agree to reduce the price at the rate of 3d. per ton per 1 p.ct. excess over the 6 p.ct. On the other hand, the buyers agree to pay the sellers an addition to the price at the rate of 3d. per ton per 1 p.ct. below 6 p.ct. This means that 1 p.ct. reduction would

be equivalent to an additional ton of coal per 100 tons purchased, and 3d. per 100 tons is equal to 25s. But the value of 1 p.ct. computed that way takes no account of carbonizing economy and coke quality; so that the actual money value would be really higher. Another interesting condition is that, should any weekly consignment show an average of more than 10 p.ct. of ash, it is not to be considered as a delivery against the contract, but is to be regarded as offered for sale at a price to be arranged between the parties, or, failing agreement, is to be removed by the sellers at their own expense. We can well understand that the colliery owners do not like clauses of this kind; but, as Mr. Edwards says, the time has arrived when gas undertakings—themselves subject to the most stringent obligations in respect of purity, quality, and pressure—should receive a dependable and clean raw material. Regarding the prices that have had to be paid for foreign coal, and the consequent higher charges for gas, Mr. Edwards made a happy hit when he described the gas industry as acting as collectors of money for America and the Continent.

We are pleased to see the acknowledgment made by the Committee and Mr. Edwards of the valuable and loyal watchfulness of Mr. Reginald G. Clarry, M.P., during the progress of the Electricity Bill through the House of Commons and the Standing Committee. It was due to him that a clause was inserted which set some limit to the far-reaching powers of the Electricity Commissioners, who seem to have adopted hitherto, as a settled policy, the keeping of the gas industry at arm's length so far as electricity affairs are concerned. It is singular, and, in fact shortsighted, that they should take such an attitude. Apparently their view is that they must keep the electricity industry in an enclosure, and not allow anyone else to intrude, whether or not it is in the national or local interests. The very presence in the Bill of the clause which Mr. Clarry got introduced is a rebuke to the Commissioners. No one would ever have dreamed of endeavouring to obtain an enactment of this kind, had it not been for their declared policy. Now, when the Act is passed, if the Commissioners are unable or unwilling to make an Electricity Supply Order on the application of a gas company, the matter may be referred to the Minister of Transport; and any Order made by him will have effect as if it had been made by the Commissioners, and confirmed by the Minister. The Commissioners have a big chance now, with the development of the Government electricity scheme, of obtaining, through gas undertakings operating in districts innocent of electricity supply, some most economical distributors of current. Where there is already an electricity supply, and the highest efficiency cannot be realized for the gas supply, then the proper thing to do is to amalgamate with a neighbouring gas undertaking so as to strengthen the competitive position.

The Association have also been attempting excellent work to stabilize therm standard prices, and to make possible the securing of basic dividends through Special Orders. But there has been no definite adoption by the Board of Trade at present. It is likely that the success of the Gas Light and Coke Company in obtaining the introduction of a minimum dividend in the sliding-scale will cause the parliamentary authorities to regard this as a less disturbing factor in existing enactments than the change to the basic price and dividend system. If this is so, then it would be the acceptable method in Special Orders. But at the moment there has been no definite official pronouncement respecting the matter. At any rate, the minimum dividend method is the one that, in all likelihood, will be submitted to Parliament in the legislation proposed by the National Gas Council. Anyway, whatever the line adopted to prevent a repetition of the dividend slide experienced during the war, such a course is essential to restore and maintain the confidence of investors in sliding-scale companies, and to realize fair prices for new issues of capital in the interests of the gas consumers.

However, it will be seen, from our report of the proceedings at the meeting, that the Association have taken a good part in the constructive and defensive work which is necessary to the well-being of the industry in these times when its trading environment is being vastly changed—as much by external happenings as by internal movements.

Coal Carbonization and its Products.

IN Manchester, from Tuesday of last week until next Saturday, there is being held an exhibition of coal tar products, the plant for securing and dealing with them, and the scientific appliances which are necessary for making research into their development and proper application. It is the first exhibition of the kind to be held in this country; and, in view of the fact that we have hitherto been charged as a nation with being wasteful users of our primary native product, it assists to demonstrate what is being done to leave the character behind us. It is stated that exhibitions of a similar kind will be held from time to time, in order that the country may see the progress in development. It is true that we cannot rebut the charge of having utilized our fuel in a most inefficient manner; also that, in the years gone by, we have not paid that attention to the products derived from the carbonization of coal which their utilitarian and industrial value merited. All this is being changed. The exhibition is a proof of this. The very institution by the Government of the Department for Scientific and Industrial Research, with a division of it engaged in the exploration of fuel problems; the establishing of Fuel Departments at our Universities; the improvement of plant for carbonization and dealing with the products derived therefrom; the development of systems and processes for enabling scientific research to be made into them—all point to the great change that has come, and will progressively be made, in connection with the utilization of coal and the application of its valuable properties.

The exhibition, although the scope of it is not all that was originally planned (the deficiency being due to the coal stoppage), gives us good assurance that nothing is now being left undone which can be done to bring about advances in these various directions, and that we shall in time find Great Britain leading in making them. At the opening of the exhibition, Sir Arthur Duckham (who was in the chair) voiced this view. He said we have heard a great deal of what is being done in America, Germany, France, and other countries; but he is of opinion that we can do as well in Great Britain, and, when once we have got properly started, our British character will carry us farther than other people. His optimism in this respect will, we feel, be found, as time passes, to be well placed. Associated with this growing enthusiasm over scientific dealing with coal and its products, there is one thing that is being better appreciated in the world of science and industry than was the case at one time, and the same appreciation has commenced in our political life—that is, the important part that the gas industry has taken, and is taking, in releasing the components of coal in the best possible manner, so far as knowledge has developed. Capt. F. W. Bain (who is a Director of the United Alkali Company, and who inaugurated the exhibition, in the unavoidable absence of Sir Max Muspratt, Bart.) made recognition of this part of the gas industry in developing our knowledge of the constituents and utilities of coal. He also pointed to the fact, which is not commonly known, that the gas industry, in the carbonization of coal, and the distribution of its products, utilizes nearly as much capital as the whole of the mining industry itself; and he contrasted the extraordinary efficiency of the gas industry (which seeks to save the last fraction of the value contained in coal) with the great waste of coal which proceeds elsewhere, as is reflected by the report of the Royal Commission on the Mining Industry. He asserted that the money wasted in smoke alone in Manchester is over a quarter of a million sterling per annum.

However, although the exhibition has suffered somewhat in dimensions and diversity through the coal stoppage, there are good grounds for congratulating the Society of Chemical Industry, under whose auspices it is being held, and the Manchester Section, who have taken the chief part in organizing it, upon the representative and interesting display they have brought together. Those not immediately in contact with the work of coal carbonization, and the utilization of the products, will find in the exhibition much which will enlighten them on many matters concerning the country's basic product. Among the exhibitors, we notice firms whose names are house-

hold words in the gas industry, and who have taken a considerable part in its scientific development. The large area of research now proceeding is also exemplified. Very properly, among the organizations represented is the British Road Tar Association. On Friday there will be the Tar Symposium, at which several papers will be read by various authorities on the problems connected with tar. These contributions will carry us from scientific considerations relating to the production of tar on to its applications —particularly for road purposes. The "Journal" for Oct. 6 (p. 39) gave the highly attractive programme arranged for the occasion.

Making Efficient Workmen.

In these days of competition for business, efficiency in the workers on the district of a gas undertaking is of the greatest importance. We cannot over-rate it. The highest efficiency, however, cannot be realized by the old system of training a boy by merely putting him under a workman to pick up practical experience, as was the practice in the old days. Very much depended upon the craftsman under whom the boy was placed; and the dexterity which the boy acquired was often mixed with the defects in the practices of his trainer. But all that is now being changed. It is recognized that thorough craftsmanship needs a training which goes deeper than the ability to perform a certain task in an inflexible rule-of-thumb fashion. Practice is an essential; knowledge of fundamental principles enables practice to conform to requirement. While providing a greater latitude, the knowledge also inspires interest and responsibility, and improves character, which are all required by men who are (say) executing work within private premises for the undertaking which gives them employment. The honour of that undertaking is, or should be, the concern of the men; and they can show this best by carrying out their work with skill and fine finish, and leaving the job so that their part completes the contributory efficiency to enable appliance and gas to give of their best. A man who has been thoroughly grounded in the "whys" and the "wherefores" of practice, not only realizes the responsibility of his position, but is able better to exercise judgment. The knowledge also engenders an interest, which removes the monotony which comes from repetition work day after day. Efficiency in the man also means satisfaction to the consumer; and the satisfaction of the consumer is a good trading asset. It is the recognition of all this, and perhaps more, by those responsible for the direction of the Gas Light and Coke Company—especially the Governor (Mr. D. Milne Watson)—that a new educational centre of an extensive character has been equipped by them with laboratories and workshops, where apprentices can be trained, and all sections of the sales and public service staff can get instruction in the scientific principles and technical details of their work. Here they are carried into the innermost recesses of appliances, performances, testings, and practices; and this enlarges their understanding, ability, and interest. Cause and effect are brought within the ambit of knowledge; and this develops skill. Details regarding the lines of instruction and equipment at "Watson House"—a designation paying a well-deserved compliment to the Governor—are given in a special article on later pages. Dominating all is thoroughness, which is so essential to the work of the gas industry. The Company have taken this step because they believe in elevating the efficiency of their men. It is a grand step forward in the activities of the Gas Sales Department. As much work as could be done has been carried on under the cramped conditions at Horseferry Road; but the new quarters entitle the department to develop on lines which it has been desired to follow for a long time. It is all a logical development of the policy of service to customers after sale, which has been advocated—particularly by Mr. F. W. Goodenough—during the past quarter of a century. Of course, the necessary organization and the personnel to operate it are not to be created in a day; but it is high time that many gas undertakings began to realize that they are necessary. What the Gas Light and Coke Company are doing may inspire the administrators of other large gas undertakings to do likewise. If it does, they will not regret it.

Price of Coke.

The prices ruling for coke have had mention in the House of Commons. Some people seem to think that coke, although its calorific value is approximately that of the coal from which it is made, should be sold at prices per ton below the cost per ton of the original coal. People who so complain do not realize that it takes approximately 2 tons of coal to produce for sale 1 ton of coke; and the fact is not generally known that during the scramble for coal in recent months, gas companies have had to pay very high prices, which have reached in some instances over £5 per ton. Sir C. Oman (Oxford University) the other day called the attention of Col. Lane-Fox, Secretary for Mines, to this matter of coke charges; but Col. Lane-Fox knew more of the difficulties of the situation than did his questioner. He informed him how, for some months past, gas companies have been dependent almost entirely upon foreign coal, some of which has given a relatively low yield of coke (poor stuff some of it has been), and for the coal from which it has been made very high prices have had to be paid.

Worthless Shares.

This question was raised in the House of Commons on Tuesday last week; and the President of the Board of Trade (Sir P. Cunliffe-Lister) stated that he was well aware of the activity of persons who engage in the pushing of worthless shares. This is a matter which, among many others, occupied the attention of the Company Law Amendment Committee; and the President hopes it may be possible to introduce a Bill next year based on their recommendations. He does not, however, think it is possible for him to issue a warning to the unsuspecting public to treat with suspicion all unsolicited advances or personal visits regarding investment in, or re-investment of, securities. This is a matter in which good advice can, he thinks, be given through the medium of the Press.

Temporarily Prohibiting Gas Coal Exports.

A telegram from Rotterdam states that it is rumoured in Continental coal trade circles that, on the conclusion of the coal stoppage, Great Britain, while permitting the export of bunker coal, will, during the first three weeks, prohibit the export of gas coal.

New Houses.

Since the war, the approximate number of houses completed in England, Scotland, and Wales is 808,792, of which 511,890 have been built with State assistance, and 296,902 without.

Strikes and Rates.

The question of higher rates to meet the heavy expenditure on poor relief, due to the general strike and the stoppage in the coal industry, is causing grave concern to our industries. In a recent address at the Constitutional Club, Sir Robert Horne, M.P., commented on the matter. He pointed out that, during the stoppage, the country out of public money has supported the families of the strikers to an extent which has never before been known in this country, and has never even been contemplated in any other country in the world. Through this relief, enormous burdens have been imposed upon local authorities and industry. He instanced Sheffield, where a ton of steel in 1914 carried a burden of 2½d. for poor rate; in 1924, it was carrying 5s. 1d. In another works, the incidence of the poor rate has gone up from 8d. to 13s. 3d. per ton of steel. It can readily be seen how this enormous imposition upon our products places them at a disadvantage in the markets of the world. Of course, it is impossible to see fellow-beings starving; but something should be done to prevent national relief in this way assisting to prolong a stoppage which aims at producing national effects of a destructive nature. As Sir Robert says, the extent to which relief is found for those who are on strike must necessarily make people take a more irresponsible attitude in entering upon a strike. The country, paying relief, is entitled to put some regulation and restriction upon the way in which industrial stoppages occur; and trade unions must be placed in a more responsible position towards the law than they are at present. All other organizations have to repair injuries which are illegally committed; trade unions must be made

similarly liable. The way some of the trade union leaders have been behaving this year suggests that, instead of progressing in civilization, they have been making a retrograde movement. They had better sit down and count the cost of their methods to the country, industries, trade, and consequently to their own followers. A few of them have done so, and acknowledge their mistakes.

Coal Exports.

For the sixth month this year, the Board of Trade Returns show an appalling state of things in connection with the coal industry. The total quantity of coal exported during October was 3812 tons, but the whole of this appears under the category of "Other Sorts," with the exception of 10 tons of anthracite, 148 tons of steam coal, and 45 tons of household coal. The 3609 tons of "Other Sorts" had Finland for their destination. The value of the whole quantity amounted to only £2408; that for Finland being represented by £1568, which shows that it was material of poor quality. October, 1925, had an export of 4,382,484 tons, of a value of £4,017,907; and October, 1924, 4,932,852 tons, of a value of £5,492,046. Taking the ten months of the year, the figures mirror the disastrous effects of the stoppage upon our business abroad. This year the shipments have totalled 18,982,691 tons, of a value of £17,246,864. The corresponding period of 1925 saw 41,847,299 tons disposed of overseas, with a value attached of £42,215,131. In the same months of 1924, 51,724,948 tons were shipped, having a value of £61,329,652.

Gas Coke Shipments.

All the gas coke produced has been required at home. The returns for October show that only 14 tons were shipped, of a value of £51, as compared with 133,963 tons in October, 1925, of a value of £126,535, and 99,197 tons in October, 1924, of a value of £174,000. In the ten months, 383,422 tons of gas coke were sent abroad, of a value of £395,492. The corresponding period of 1925 saw shipments totalling 570,105 tons, of a value of £646,535. In the same period of 1924, 821,037 tons were shipped, of a value of £1,438,147. Business in metallurgical coke and manufactured fuel, such as briquettes, has similarly suffered.

Tar Product Exports.

The export of benzole and toluole in October diminished to the low figure of 50 gallons, compared with 3923 gallons in October, 1925. In the ten months of the year, however, 420,108 gallons have been shipped, as against 145,149 gallons in the same period of 1925. Naphtha shipments stand at 1460 gallons for the month, compared with 8681 gallons in October, 1925. During the year, however, to the end of October, 60,936 gallons have been exported, as against 47,918 gallons in the corresponding period of 1925. Regarding tar, oil, creosote, &c., there was a colossal drop for the month to 302,080 gallons, which compares with 3,769,639 gallons in October, 1925. For the ten months, 34,224,830 gallons were sent abroad, as against 35,321,649 gallons in the same months of 1925.

Sulphate of Ammonia Shipments.

Sulphate of ammonia business abroad appears to be continually dwindling. In October, only 5585 tons were disposed of overseas, as against 26,382 tons in October, 1925. The total exports for the ten months amount to 149,268 tons, as compared with 223,680 tons in the corresponding period of 1925—a difference of 74,412 tons. The coke-ovens having been non-productive so long, have, of course, made a considerable difference to the quantity of sulphate available for sale.

Gas Oil Imports.

The big demand for gas oil, due to the coal stoppage, is again reflected in the returns for October. In the month, no less than 16,892,717 gallons were received, as compared with 2,932,021 gallons in October, 1925. During the ten months of the year, 91,226,780 gallons have been landed, as compared with 56,541,913 gallons in the corresponding period of 1925—an increase of 34,684,867 gallons.

PERSONAL.

PRESENTATIONS TO MR. AND MRS. THOMAS GLOVER.

To mark the completion of 25 years' service as Engineer and Manager of the British Gas Light Company's Norwich Station and the appreciation of the staff and employees of the Company of the honour conferred on him by his selection as Lord Mayor of the city, Mr. Thomas Glover has been presented with a silver cigarette box, and he and the Lady Mayoress with a silver dessert service, both gifts being suitably inscribed.

Mr. J. Matthews (Chief Mainlayer), who presided over a large company, said that, to mark their appreciation of the splendid work their Chief and the Lady Mayoress had put in during their term of office as Lord Mayor and Lady Mayoress, and further suitably to recognize their Manager's 25 years' service, they had asked Mr. and Mrs. Glover to meet them there that night. Various other speakers congratulated the guests of the evening—the Lord Mayor on his dual achievement and the Lady Mayoress on the gracious way in which she had filled that high office. Mr. Ward, in making the presentations, said he hoped the Lord Mayor and Lady Mayoress would accept the gifts in the spirit in which they were offered, and that the recipients would live long and happily to enjoy them fully.

After a gracious acknowledgment by the Lady Mayoress, Mr. Thomas Glover said he could not have got through his year of strenuous work in the city, but for the help he had received from his wife. On her behalf, as well as his own, he thanked those present sincerely for the beautiful gifts they had bestowed upon them. When he came to the city, the output of gas was 360 million c.ft.; and though it was now 830 millions, he would say they had not finished yet. He would not be supremely happy until it reached 1000 million c.ft. The Lady Mayoress and he had tried to help all worthy causes; and he hoped some good would come from it. As to his relationship with the staff, there were three headings he had tried to work under. The first was that earnings should be sufficient to maintain a reasonable standard of comfort; the second was that there should be reasonable hours; and the third was that, as a man was a man, he deserved to be treated as such. He wanted them all to feel that industry should be regarded as a great national service. They ought to have the joy of knowing that they were working to some real purpose and for the good of the community.

Mr. FRED L. LAYCOCK has been appointed Secretary and Manager of the Kildwick Parish Gas Company. He received his early technical training at the Keighley Technical College.

A presentation was made on Tuesday of last week to Mr. JAMES W. WILSON, of Messrs. Wilsons & Mathiesons, Ltd., Armley, Leeds, on the occasion of his 70th birthday. Mr. T. Goodison, the oldest employee, handed to him a bronze of a horse, as a mark of esteem from the employees; and Mr. F. W. Timms, on behalf of the representatives, asked his acceptance of a handsome barometer. Tributes were paid to Mr. Wilson's character as a model employer.

Mr. S. G. M. URE has been appointed Hon. Editor of the "Transactions" of the Institution of Chemical Engineers. He will also be responsible for the editorial matter appearing in the "Quarterly Bulletin."

Mr. W. BLAKELEY, Managing Director of Messrs. Firth, Blakeley, Sons, & Co., Ltd., of Church Fenton, Leeds, was a passenger in the York to Bristol express, which was wrecked at Parkgate on Friday last, with heavy loss of life; and in several Press reports his name was included in the list of those injured. Happily, however, Mr. Blakeley's injury was very slight, consisting of a cut in the left hand; and except for the shock, he is now quite right again.

OBITUARY.

Many old friends will regret, with us, to learn of the death, which occurred on Nov. 16, at St. Leonards-on-Sea, of Mrs. SARAH EMMA CUTLER, the widow of Mr. Samuel Cutler. The interment, last Saturday morning, was in Chingford Cemetery.

We are sorry to learn of the death of the wife of Mr. C. F. BLINCOE, the Manager of the Middlesbrough Corporation Gas-Works. Previous to her marriage (which took place only about three years ago), Mrs. Blincoe was for many years Matron of the West Lane (Middlesbrough) Sanatorium and Hemlington Hospital.

Mr. R. C. S. RADFORD, Manager of the Ashburton Gas-Works, passed away on Tuesday, Nov. 16, at the age of 50. He had been ill for about a fortnight; but his condition showed such a decided improvement on the day preceding his death, that the end came as a great shock. He was engaged at Selsea and Exeter prior to his appointment in charge of the Ashburton Gas-Works a year ago.

ELECTRICITY SUPPLY MEMORANDA.

THROUGH the efficiency of the supporters of the Government in the game of follow-my-leader, the Electricity Bill has had its third reading in the House of Commons. The progress that the Bill has made so far has not been on the ground of merit or propriety, because there are comparatively few members of the House who understand its technicalities and all it means. The Government, and particularly the Attorney-General (Sir Douglas Hogg), think they know all about it; but the generalities regarding it that they have been parading inside and outside the House during the past year are conclusive that their knowledge on the subject is beautifully superficial. The Attorney-General, on handing over the Bill to the House on its third reading, clearly illustrated this. He said the great step the Bill is going to take is to make electricity generation efficient; and all the Government are advocating is the cheapening of electricity to the consumer. We have not seen the slightest evidence which gives confidence that this will be the result. What we have seen is abundant evidence that advocacy and hopes will be sadly disappointed. The basis of their confidence is pure theory, which has been attacked unmercifully by practical minds possessing a greater knowledge of the potentialities of electricity supply than any member of the Government can claim. Their faith in theory rather than in practical considerations is one of the amazing things about the passage of the Bill in Parliament. Another point is that the Socialists are extremely pleased with the Bill, so far as it goes. They would like it to go farther; and for this they tried hard by submitting a motion at the final stage which, while acknowledging that the aim of the measure is to secure a unified system of electricity supply, recorded its failure adequately to protect the public interests, while perpetuating the existence of private ownership in a service "which ought to be owned and controlled by the community, and co-ordinated with the scientific production and utilization of coal." The motion was, of course, defeated. The Attorney-General finds in the measure the provision of a bulwark against the nationalization of electricity. Other people see, in the establishing of electricity generation under a Central Board appointed by a State Department, a concentration which will make, should the favourable time come, the transfer from one state to another an easier matter than would otherwise be the case. Most men who have critically studied the measure raise their eyebrows in surprise when they read that the Government regard the measure as providing a defence against nationalization. A Socialist Government could not have prepared the way better for that consummation. However, the Bill has received its third reading in the Commons. The host of amendments proposed, or the majority of them, have been pushed out of sight, and will be forgotten unless again brought forward in the House of Lords. It is not likely that there the Bill will receive the microscopic examination it has had in the Commons; but it is probable that general principles rather than details will receive the attention of their Lordships.

The Bill.

Statistics. Official statistics issued by the Electricity Commissioners lose much of their interest through seeing the light of day long after the period to which they refer. They have recently published a voluminous document giving data for two years up to March 31, 1925, for local authorities, and Dec. 31, 1924, for companies. It is seen that the electricity generated during 1923-24 totalled 5288·7 million units, and in 1924-25, 6022·2 million units. The units generated in 1923-24 were an increase of 16·4 p.ct. on the preceding year; and those for 1924-25, an increase of 13·8 p.ct. on 1923-24. Of the units generated in 1924-25, 98·09 p.ct. were produced by steam plant; and 6,600,000 tons of coal, coke, and minor quantities of other fuels were required. The units sold in 1924-25 numbered 5097·3 million, which were distributed in use as follows: Power, 69·3 p.ct.; lighting and domestic supply, 20·3 p.ct.; traction, 8·8 p.ct.; and public lighting, 1·6 p.ct. In 70 p.ct. of the undertakings, less than 100 units per head of the population were sold. In the case of 19 undertakings, 300 or more units were sold on the basis of the resident population. For the whole of Great Britain, the *per capita* average was 117 units per annum, which compares with 88 units at the end of 1922-23. But this figure is misleading, as no account is taken of the energy generated for traction, colliery, and other industrial purposes in many stations not owned by statutory undertakings. Of the gross output of current, only 81 p.ct. is sold to consumers; 19 p.ct. being used on works or lost in transmission. The average price per KW.-H. sold in 1924-25 by local authorities was 1·8d., and by companies 1·71d.—these averages being obtained by combining the low-priced power units and the high-priced lighting units. The average working expenses show a somewhat similar ratio—1·05d. and 0·94d. In 1923-24, the average fuel consumption per unit generated was 2·71 lbs.; in 1924-25, 2·55 lbs.

Current Movements. The "Wiring of Britain's Homes" campaign, we are told, is making "steady progress." More electrical circles are being formed for the purpose of pushing things; more specimen all-electric houses are being equipped with as many appliances as a millionaire can afford; but a healthy consideration is that it is bringing together in delightful unity the various sections of the industry. That is to the good. The objects of the campaign, as we have before explained, are to obtain for electricity entrance to homes—probably through assisted wiring, if not possible by other means—to get hold of the lighting, and to work from that to electric cooking and heating. That is the plan. Just now one thinks of not only lighting, but heating. Heating is a costly business in these days, whatever the agent; and for heavy expense electricity wins easily. But in winter time no one can do without heating; and the gas industry is working energetically to oblige as many people as possible. Those who cannot get prompt attention are, in some cases, reluctantly putting in electric radiators, and are accordingly suffering in pocket.

Electrical Ladies. If the ladies of the electricity industry are going to take a hand in attempting to develop the uses of electricity and to stop the progress of gas, care should be taken that they are fully primed on all points, and do not, through omission, give to the public misleading information. There has been some correspondence in the "Manchester Guardian," in which ladies have been chiefly participating. One housewife quoted the money she had had to pay for gas and electricity. Commenting upon the letter, Miss (?) Gertrude L. Entwisle (who is the Hon. Secretary of the Manchester Branch of the Electrical Association for Women) stated that, if the housewife "found that her bills came alike with electricity at 1d. per unit and gas at 9d. per therm, it meant that her electrical apparatus was three times as efficient in conserving the heat generated as her previous gas apparatus." Not necessarily so. Miss Entwisle does not take into account the important factor of work done, and, unless she knows this, her comparison of "efficiency" is simply ridiculous. A great deal more work may have been accomplished on the gas cooker than on the electrical cooker. What does Miss Entwisle's statement amount to? It is this: Taking the potential heat of the unit of electricity (3412 B.Th.U.), and the heat of a pennyworth of gas at 9d. per therm (11,111 B.Th.U.), and remembering that the overall efficiency of the electric cooker (including the hotplate) may be only between 40 to 50 p.ct., then in the gas cooker over 9000 of the 11,000 B.Th.U. are wasted. When this fact is brought to the notice of Miss Entwisle, we think she herself will agree that her statement did not lack absurdity. Another of her statements is: "All apparatus, even all electric apparatus, is not equally efficient; but the fact that a flue is provided on a gas cooker means that some proportion of the heat generated is wasted." Of course it is; but the gas oven with heat energy supplied at 11,000 B.Th.U. for a penny can afford to have a certain amount of waste in comparison with electricity, which, owing to its thermal dearness, has to be safeguarded to an extraordinary degree. Even so, there is waste of heat from the oven by radiation, and through the ventilator—if one is provided, as it should be in order to maintain healthy conditions in the oven when cooking of meat is proceeding. There is also the heat which escapes from the hotplate. There is no electrical cooker which has 100 p.ct. efficiency, as would be suggested by Miss Entwisle's idea of "three times as efficient" as a gas cooker. Talking of efficiency and conservation, Miss Entwisle does not give any information concerning the relative thermal efficiencies of the gas process and of electricity generation, which shows so well in favour of the former, and attests an enormous superiority in respect of the conservation of coal.

Electric Irons as Fire Raisers. A correspondent has forwarded to us a copy of "The Fire Hazard News," which is not a regular newspaper, but a method of advertising the "Safe Economy" electric iron, which is fitted with a grip-switch in the handle. The contents of the sheet constitute a collection of items from various newspapers dealing with fires caused by "ordinary" electric irons. It strikes us that, to call attention to the fire-raising propensity of other electric irons is a singular way of advertising a particular type; but the other irons have not in their handles the grip-switch, which, we suppose, is the one thing needed to ensure safety. The collection, however, serves as a salutary warning to all into whose hands the advertising sheet may fall; and it may be effective in causing a disinclination in people to use an iron, even though it has a grip-switch in the handle. There are sixteen cases recorded of fires which were started by electric irons; and most of them occurred between May and July this year. At the foot of the sheet are the ominous words: "Further cases coming to hand daily." The first instance appeared in the "Evening News" on April 9 last; and it occurred in a Kensington flat,

through an electric iron having been left switched-on. In the same paper on March 17, a letter related how an electric iron, which had been "left on," burned its way through a table and the floor boards below, and then was held suspended by its wire. The "Ilford Recorder" for June 4 contained an account of how a fire took place at Seven Kings owing to an electric iron becoming red hot. The "Draper" for May 29 reported a fire at Dartford, which was caused by an electric iron in a costumier's workroom. Two fires—one being due to an electric iron, the other to the fusing of a wire—were announced in the "Halifax Courier" for June 26. Other cases are from the "Yorkshire Herald" for April 8; the "Hackney and Kingsland Gazette" for May 21; the "Beckenham Advertiser" for June 4; the "Doncaster Gazette" for June 11; the "Hackney Gazette" for June 16; the "Manchester Evening Chronicle" for May 26; the "Middlesex County Times" for April 17; an ancient one from the "Daily News" for Oct. 9, 1922; the "Stockport Advertiser" for July 2 last; and the "Yorkshire Post" for May 31. We have quoted the sources of the information, as they show that the experiences are well spread. At the same time, we do not admire those fishmongers who describe as "stinking fish" the wares of tradesmen in the same line of business.

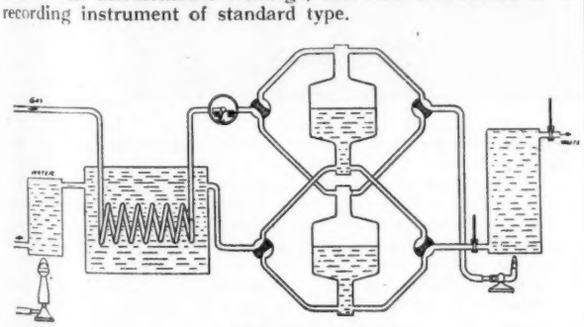
Big Anticipations. Our electrical friends are optimistic. The Government electricity scheme, it will be remembered, is based upon an enormous growth of consumption by 1940. The prophets of old, were they with us now, might envy the daring in prediction of our electrical contemporaries. The view as to rapid growth is spreading in the electricity industry, the advisers of which are, in all sorts of ways, suggesting preparation for the great time that is coming. The energy which is being displayed on the sales side is thought to warrant that belief; it is considered to justify also a big overhauling and extension of distribution systems. Standardization of the design of these systems was the subject of a paper, by Mr. J. R. Beard, M.Sc., and Mr. T. G. N. Haldane, B.A., recently read before the Institution of Electrical Engineers. We will not go into the technical aspects of the paper; but it is noticed that their advocacy of the standardization of distribution systems is based upon the belief that the future of electricity supply, particularly the domestic load, will bring not slow development, but rapid growth, which will at least double, and possibly quadruple, existing loads within the next ten years. It is stated that many electrical authorities consider that standardization would have a larger influence than anything else in cheapening and extending electricity supply. The ideal is that the electricity consumer should never be troubled with technical questions of voltage or type of current, just as a gas consumer is never troubled with questions of pressure or calorific value. The authors' main object was to discuss the design of a system suitable for adoption as a standard, and to consider how far existing systems could be gradually brought into line with it, particular attention being given to the planning of a system layout which would facilitate expansion to deal with a growing load. Many gas undertakings, with consumption expanding at the present rate, will have to consider the enlargement of parts of their distribution plant, as well as the installation of boosting plant for peak heating loads. Standards of provision have to be revised in these times, with demand fluctuating so greatly between periods of a day and seasons of the year.

Failures. Due to coal troubles, there was a loss of steam pressure at the Preston Corporation electricity generating station last Saturday week; and the supply failed for over an hour. The town was thrown into darkness only where gas does not reign. The Empire Theatre was able to carry on by the aid of gas-lights; but the cinemas did not like the position. The primitive candle aided, to the best of its power, shopkeepers, licensed premises, and clubs that had reposed faith in the fickle jade. On Nov. 7, Dundee's supply suffered half-an-hour's collapse, owing to a breakdown of the plant. The tramway system and the lighting were both affected.

A CONTINUOUS GAS CALORIMETER.

A short description, with diagrams, by S. W. Parr, of the University of Illinois, Urbana, is contained in the November issue of "Industrial and Engineering Chemistry," of a proposed continuous recording gas calorimeter of the flow type.

The instrument does its own metering, and automatically controls the temperature and pressure of the water and gas passing through the apparatus. The burner is of the ordinary bunsen type; and the heat of the gas is imparted to an equivalent volume of water. Under the conditions of control, therefore, as to temperature and pressure, a single constant for the instrument is obtained, which can be applied directly to the differential thermometric readings, and thus transferred to a recording instrument of standard type.



Flow Sheet.

Proceeding from left to right in the diagram, there is a simultaneous flow of water and gas. The gas is shown as having a passage through the lower of the two bottles, and the water as having a passage through the upper bottle. This latter water is displacing an equivalent volume of gas, which is shown as having a free passage to the burner; while the water in the lower bottle has a free passage to the vessel serving as a heat transferer immediately above the burner. It will thus be seen that the volume of gas burned is imparting its heat at all times to an equivalent volume of water. Hence if the temperature and pressure of the gas are maintained at a given standard, a constant factor may be derived for transferring the heat increase of the water to a recording instrument.

Institution Examinations.—In the second list of successful internal candidates in the Institution examinations in Gas Engineering and Gas Supply (*ante*, p. 418), Mr. L. Poulter should have been reported as "Passed with distinction."

NOTES ON NEW BOOKS.

GAS AND GASES.*

The author of this book, which is one of the latest additions to the "Home University Library of Modern Knowledge," published by Messrs. Williams & Norgate, Ltd., has given in a most attractive and readable manner an account of the main properties of the gases of the atmosphere and of one or two of the more useful gases, such as chlorine and carbon monoxide. The book, which includes a short bibliography of the subject, is one of about 250 pages, the first 170 of which are taken up by a consideration of the constituents of air. A further forty pages deal with what the author terms useful gases, while the remainder of the volume concerns itself with gaseous fuels and combustion. The treatment is essentially elementary and popular.

* "Gas and Gases," by R. M. Caven, D.Sc., F.I.C. Published by Williams and Norgate, Ltd.; price, 2s. net.

FORTHCOMING ENGAGEMENTS.

Nov. 26.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Meeting at the Westminster Technical Institute. Paper by Mr. F. S. Larkin.

Dec. 2.—MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Formal meeting for election of officers.—Grand Hotel, Birmingham, at 3.30.

Dec. 4.—WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION.—Joint visit with Western Junior Gas Association to the Beckton Works of the Gas Light and Coke Company.

Dec. 4.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—Joint meeting with Eastern District, at Edinburgh. Paper by Mr. C. B. Tully.

Dec. 7-8.—INSTITUTION OF FUEL TECHNOLOGY.—Meeting.

Dec. 8.—MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.—Visit to the Stretford Gas-Works. Paper by Mr. J. Carr.

Dec. 8.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Visit to the works of Messrs. Parkinson & Cowan, Ltd.

Dec. 14.—NATIONAL GAS COUNCIL.—Meeting.

Dec. 14.—FEDERATION OF GAS EMPLOYERS.—Meeting.

Dec. 16.—MIDLAND JUNIOR GAS ASSOCIATION.—Meeting at Birmingham. Paper by Mr. A. Knight.

Dec. 17.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Meeting at the Westminster Technical Institute. Paper by Mr. C. M. Croft.

Feb. 16.—"B.C.G.A." MIDLAND DISTRICT CONFERENCE.

INSTITUTION OF GAS ENGINEERS.

Dec. 13.—Emergency Committee, Finance Committee.

Dec. 14.—Advisory Committee on Education.

NORTHERN COKE RESEARCH COMMITTEE.

Initial Support and Work.

The first meeting of the Northern Coke Research Committee was held at Armstrong College, Newcastle-upon-Tyne, on Tuesday, Nov. 9.

Dr. Cecil A. Cochrane took the chair; and there were present also Major E. O. Henrici (Secretary of the Fuel Research Board), Mr. Paul List and Mr. E. Tosh (West Coast Blast Furnace Owners' Association), Major A. C. Scoular and Mr. D. R. Wattleworth (Cumberland Coal Owners' Association), Dr. Henry Peile (Durham Coal Owners' Association), Mr. A. H. Middleton and Mr. W. E. Mordecai (Coke Oven Managers' Association), Dr. L. Slater (Blast Furnace Coke Research Committee, Yorkshire and Derbyshire Coalfields), Sir Theodore Morison, Prof. Granville Poole (Armstrong College), Mr. E. C. Evans (Organizing Secretary), and Prof. H. V. A. Briscoe (Secretary).

Letters were received from the Durham Coal Owners' Association promising £150 for the first twelve months, and from the Cleveland Ironmasters' Association stating that the local steel making firms had agreed to contribute a further sum of £75. Consideration of the promises of financial support which had already been made by the industry and by Armstrong College, together with the expectations of further assistance from the Fuel Research Board, showed that the Committee had at its disposal funds sufficient to permit an immediate beginning of work upon the research programme. The Committee approved proposals to convert and equip as a research laboratory a vacant building in Armstrong College, and adopted a detailed research programme summarized in the statement that the work of the Committee shall be: To apply laboratory tests of physical and chemical properties to typical cokes from the Northern area, and to secure such samples, data, reports, and other records as will serve, at the time or subsequently, to correlate the results of the tests with:

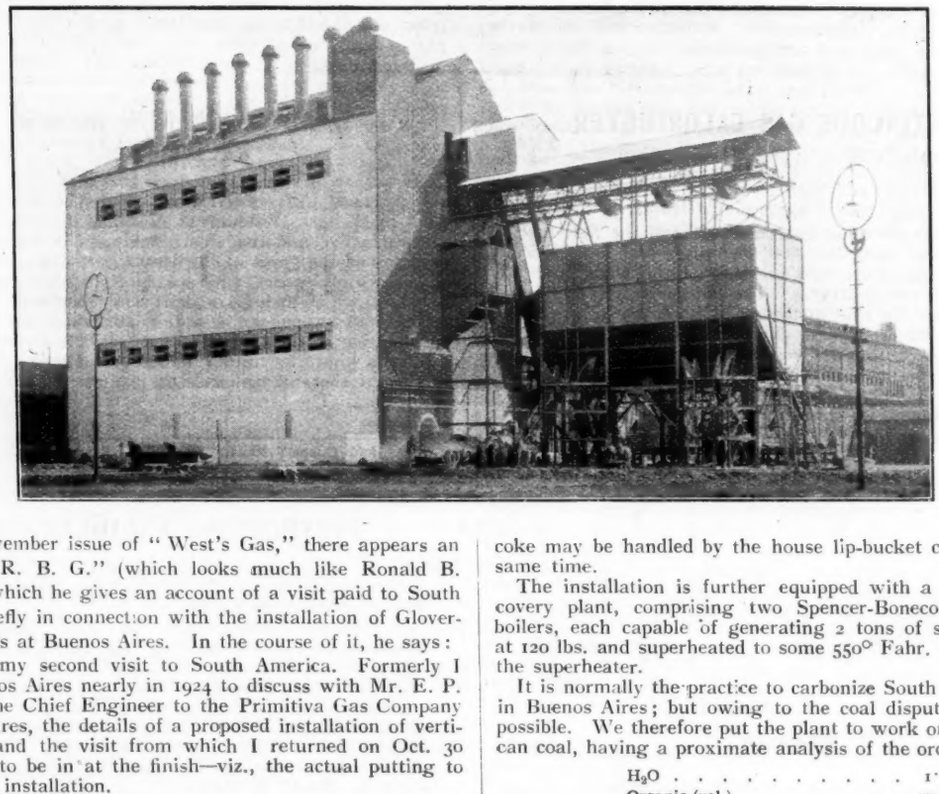
(i.) The sources and nature of the raw coal.
(ii.) The methods of coking.
(iii.) The behaviour of the cokes in use in industry and as domestic fuel.

The Secretary and Prof. Poole were given authority to proceed with the research scheme as staff and laboratory facilities became available. Estimates of expenditure for the year 1926-27 were approved, for submission to the Fuel Research Board.

At the conclusion of the meeting, Dr. Cochrane having informed the Committee that the pressure of other duties prevented his accepting the office of Chairman, on the motion of Mr. A. H. Middleton, seconded by Sir Theodore Morison, Dr. Henry Peile, C.B.E., was unanimously elected to the chair.

GLOVER-WEST VERTICALS AT BUENOS AIRES.

Installation Trials with North American Coal.



In the November issue of "West's Gas," there appears an article by "R. B. G." (which looks much like Ronald B. Glover), in which he gives an account of a visit paid to South America, chiefly in connection with the installation of Glover-West verticals at Buenos Aires. In the course of it, he says:

This was my second visit to South America. Formerly I visited Buenos Aires nearly in 1924 to discuss with Mr. E. P. Stevenson, the Chief Engineer to the Primitiva Gas Company of Buenos Aires, the details of a proposed installation of vertical retorts, and the visit from which I returned on Oct. 30 enabled me to be in at the finish—viz., the actual putting to work of the installation.

On the day following my arrival, I inspected the plant with Mr. Stevenson; and we found that all was well for an early start. Drying fires had been in for several weeks; and we were satisfied that we might immediately proceed to increase temperatures, and prepare for gaseous firing, and that the mechanical details and connections would be ready in good time for gas-making.

The installation at Buenos Aires comprises eight settings of 33 in. (New Model) retorts, 25 ft. long, heated in units of four retorts, and is in every respect of standard design. Coal is handled from a receiving trough by a large coal lip-bucket conveyor, and is fed into two twin breakers and elevators situated above ground. These elevators in their turn deliver on to the top strand of the house lip-bucket conveyor, which is designed to form a loop over a battery of coke-storage hoppers; coke being discharged into these hoppers from the bottom strand of the aforementioned loop. In this way both coal and coke may be handled by the house lip-bucket conveyor at the same time.

The installation is further equipped with a waste-heat recovery plant, comprising two Spencer-Bonecourt waste-heat boilers, each capable of generating 2 tons of steam per hour at 120 lbs. and superheated to some 550° Fahr. at the outlet of the superheater.

It is normally the practice to carbonize South Yorkshire coal in Buenos Aires; but owing to the coal dispute this was not possible. We therefore put the plant to work on North American coal, having a proximate analysis of the order of:

H_2O	1·5
Organic (vol.)	37·2
Coke	62·8
Ash	8·6

The plant went to work without any difficulties; and the Argentine stokers showed an admirable willingness to learn their new duties.

After the men had had some few weeks to become thoroughly conversant with their duties, the plant was put on test for a period of 28 days, through which time its thermal output exceeded the guarantees by some 10 p.ct., with a make per ton of 20,800 c.ft. at 490 B.Th.U.

The waste-heat recovery plant was able to produce the greater portion of the steam required for the exhausters, pumps, &c., together with the necessary steam for steaming the retorts, the generation of alternating current sufficient to drive the whole of the auxiliary plant in connection with the 3¼ million installation of vertical retorts.

NATIONAL COAL PRODUCTS, CHEMICAL, AND ENGINEERING EXHIBITION.

The Opening, and the Exhibits.

The National Coal Products, Chemical, and Engineering Exhibition, which was opened on Tuesday, Nov. 16, by Captain F. W. Bain, a Director of the United Alkali Company, Ltd. (in the absence of Sir Max Muspratt, Bart., who had originally intended to perform the ceremony), is unfortunately on a much smaller scale than it would have been but for the industrial troubles of this year. The exhibition has been organized by the Manchester Section of the Society of Chemical Industry, and has been supported—as in the case of the Tar Conference which is to be held on Friday, Nov. 26—by the Coke Oven Managers' Association, the Institution of Gas Engineers, the Fuel Section of the Society of Chemical Industry, the Manchester Geological and Mining Society, and the Institution of Mining Engineers. The object has been to represent as far as possible the methods of utilizing coal, and to give a general impression of the part which coal and its products play in the chemical industry of the country. Originally it was intended to show the various processes to which coal is subjected after its arrival on the surface. When the exhibition was originally projected, the coal stoppage had only just commenced; but it was hoped that the situation would have materially improved long before the exhibition was due to be opened. Further, it was felt that it would be a distinct advantage to hold an Exhibition of this nature in a city which could be regarded as the centre of the greatest industrial area in England, and probably the greatest industrial area in the world. Owing to subsequent developments, the original scheme had to be abandoned; but the organizers must certainly be congratulated upon having secured a representative exhibit of the sections of the industry not affected by the dispute. It is naturally regrettable that, in an exhibition with a title so comprehensive, there should only be a matter of about 45 exhibits; but special efforts have been made, with a large measure of success, to show something of the nature of the research work which is being carried out in this country on coal and coal products. No exhibition of this kind has been held previously; and considering the good response which, in the circumstances, has been given, the organizers hope that under normal conditions, an exhibition of this type, held occasionally, would prove successful from all points of view.

OPENING CEREMONY.

At the opening ceremony, Sir ARTHUR DUCKHAM, K.C.B., presided.

Captain BAIN paid a compliment to the Manchester Section of the Society of Chemical Industry for the courageous and determined way in which the work had been carried on in face of the difficulties encountered. Great Britain, he said, had many claims to precedence as regards the utilization of coal for the production of steam and for domestic uses. This was the first country in which gas was produced from coal; and to-day the capital invested in the gas industry amounted to £160,000,000—almost as much as that invested in the mining industry itself. On the other hand, people seemed gaily to acquiesce in the deplorable policy of waste through the burning of raw coal; and the Coal Commissioners, in their report, had pointed out that £290,000 was wasted each year in the smoke from the raw coal used for Manchester's weekly wash alone. It had to be recognized to-day that Great Britain, which used to be the workshop of the world, was now only one of several workshops. Moreover, while in former days we had the world at our feet, as a consequence of our readily obtained coal supplies, now, even in normal times, we had to meet an ever-increasing competition as coal became more difficult to obtain. The newer coal seams in this country were more expensive to work, and the growth of other coal countries had diminished our geographical advantage; and these factors, coupled with the consequences of the coal strike, might well make us pessimistic enough to doubt whether we should continue to have the capacity to deal with industrial difficulties.

After a reference to the Coal Commission's wasted report as one of the most remarkable official documents of our time, and to the growing and even dangerous development in industry of entrusting negotiations to skilful advocates with the desire to secure points rather than obtain agreements, Captain Bain maintained that all these considerations, while affording ground for pessimism, were bound to result in a natural reaction, and from that point of view there were strong grounds for optimism. He believed that in all branches of engineering we still had that spirit of adventure and inventiveness which is so essentially British; but what had been lacking, except in a few isolated and somewhat splendid instances, had been the venturing of capital on a large scale on fundamentally new enterprises. Incidentally, he commented with satisfaction on the recent combination of heavy chemical manufacturing companies. Secondly, we needed to apply more the principles of scientific salesmanship, because experience had shown that where conditions of marketing had been carefully studied and exploited, the sale of British goods had been greatly increased. Finally, he called attention to the great field left for technical exploration in regard to coal and coal products, recalling that out of 147 million tons of coal mined in 1924, only 37 million tons were used in a scientific manner—namely, in gas-works and coke ovens. There was much on the way at the present time which, unfortunately, circumstances had prevented being shown at the exhibition; but he concluded by expressing the hope that before the time came for the next exhibition of this character, the change and development would have been sufficiently great, not only to revolutionize the coal and coal products industry, but to make even Manchester itself smokeless.

Sir ARTHUR DUCKHAM said that even this exhibition was sufficient proof, not only that great strides were being made, but that even greater strides would be made in the future. It was an indisputable fact that if Great Britain was to remain a great industrial country, her fuel industries, including the getting of coal, must be put upon a scientific basis. It was to be hoped that the work of the National Fuel and Power Committee would result in a co-ordination of the various activities at work at the present time, in the suggestion of new lines upon which problems might be approached, and in the provision by the Government of assistance wherever possible. Sir Arthur, as on many other previous occasions, expressed himself an optimist that we in this country shall, with peaceful industrial conditions, be capable of carrying our industries a little farther than other countries. His reason for that, he said, was his belief in British character.

On the motion of Dr. E. F. ARMSTRONG, F.R.S. (British Dyestuffs Corporation), seconded by Mr. GUY RADCLIFFE (Chairman of the Manchester Section of the Society of Chemical Industry), a cordial vote of thanks was passed to Captain Bain.

THE EXHIBITS.

Though the exhibition as a whole has, of course, strong interest for readers of the "JOURNAL," comparatively few of the exhibits deal directly and solely with the gas industry; and we shall notice these first.

MANCHESTER CORPORATION GAS DEPARTMENT.

The Department arranged a small, though comprehensive, working exhibit of gas heated appliances, including gas cookers, fires, and hot water apparatus, showing the various applications for domestic and industrial uses. The appliances include several "Bungalow" cookers, water heaters for baths, wash basins, &c., a sitting room gas fire, and, on the industrial side, a Richmond natural draught regenerative oven furnace. Though at the time of our visit the furnace was not in operation, it is to be shown at work during the run of the exhibition. The Corporation offer to demonstrate the efficiency of gas heated furnaces for use in case-hardening, high-speed tool tempering, annealing, &c., and all processes where constant high heats are required.

WEST'S GAS IMPROVEMENT COMPANY, LTD.

This firm have a small portion of a Glover-West vertical retort and a patent "Peveril" grate burning vertical retort coke ignited and maintained by gas. For the rest, the exhibit consists of photographs of installations of vertical retorts and coal and coke handling machinery; the point of the exhibit as a whole being the advantages of the Glover-West system of continuous carbonization, in which the retort is always closed, and there is no emission of smoke and steam at charging and discharging—these operations being automatic.

SPENCER-BONECOURT, LTD.

There is shown by this firm, in actual operation, a 3B size of boiler fired with town gas. This, though so small in size, has a maximum output on natural draught of 437 lbs. of steam per hour. The boiler is fitted with the patent automatic gas regulator, as well as the automatically controlled feed, and a horizontal duplex pump—an arrangement suitable for use where the boiler is generating steam at over 25 lbs. pressure. Another and simpler arrangement is applicable for lower pressures. The Spencer-Bonecourt patent system of gas firing is demonstrated on this boiler. As no primary air is introduced into the gas, all dangers of back firing and explosion are eliminated. The Company, under their Kirke patent, have embodied the essential features of the Spencer-Bonecourt gas-fired steam boiler in the Spencer-Bonecourt water heaters, which have a guaranteed efficiency of 83 p.ct.

BRITISH ROAD TAR ASSOCIATION.

The British Road Tar Association, which is representative of the gas industry and the bye-product coking industry, has been formed with the object of ensuring that the tar produced and treated by these two industries shall continue to be available for road making and dressing in a form suitable to meet present-day requirements as regards traffic conditions. The exhibit, while showing tar as used in various ways for road purposes, is intended to serve as an Information Bureau at which highway authorities, surveyors, engineers, and all closely associated with road work, will seek information. The apparatus used in

the testing of tars for road construction work demonstrates the scientific side of the exhibit, while the samples of tars and aggregates and sections taken from roads constructed of tar macadam serve to illustrate the practical value of the materials when put to service.

The Road Tar Association claim that British tar in combination with approved mineral aggregates in the form of tar macadam, or as a top surface dressing, not only gives sufficient wheel adhesion to prevent skidding, but retains this property whether the road be wet or dry. The Association have been instrumental in improving the standard of the modern product, and are now giving consideration to standard specifications for tar. There are resources of the material in this country at present far greater than is necessary to meet the needs of the road construction and re-construction schemes; and with £40,000,000 being expended every year on our roads, there is ample scope for the well-managed propaganda which the Association have put in hand and are greatly extending.

FUSION CORPORATION, LTD.

The Corporation have on view a working model of the "Fusion" low-temperature retort for treating oil shale, torbanite, cannel, and similar deposits. The feature of this plant, as has previously been described, is that it consists of a tube rotating in a horizontal position in a heating chamber; the material in the retort tube being subject to the action of breakers, which reduce it to any degree of fineness required. The heat for the treatment of the material is obtained from a producer gas plant. The withdrawal of the gases from the hot end of the retort has been criticized, and it has been suggested that cracking of the oils will result; but the Corporation state that experience has proved this not to be the case.

SCIENTIFIC CONTRIBUTIONS.

The section of the exhibition devoted to scientific exhibits has been supported by the Fuel Departments of the leading universities, the Department of Scientific and Industrial Research, and the Research Associations related to the mining industry. For instance, the Mining Research Laboratory (British Colliery Owners' Research Association), in co-operation with the University of Birmingham, illustrate typical researches which have been, or are being, carried out. Investigations on the hydrogenation of coal were commenced in 1923, for the purpose of testing the application to English coals of the Bergius process for the conversion of coal into oil. Yields of liquid products up to 60 p.ct. of the organic matter in the coal have been obtained with certain classes of coal, including a motor spirit production of 22 gallons per ton of coal treated. It is pointed out, however, that, before the process can be a commercial success, considerably more information is required concerning the nature of the products, since they differ very widely from those obtained in ordinary coke-oven or gas-works practice. The investigations now in operation employ high-pressure hydrogen treatment on different coals; and their constituents will, it is believed, not only help in deciding how far the process is likely to meet success on a commercial scale, but will also throw considerable light on the chemical nature of the ingredients of coal. The other work which the laboratory is carrying out is also indicated—such as researches upon spontaneous combustion, the influence of pre-heating coal to various temperatures on its rate of absorption of oxygen, the absorption of gases by coal and charcoal, the permeability of coal to air and gases, and the accurate estimation of very small quantities of carbon monoxide.

The Department of Fuel Technology of the Sheffield University have divided their exhibit into two parts—one dealing with coke and the other with coal. The formation of bituminous coal from vegetable debris, through peat and lignite, is illustrated.

The Department of Scientific and Industrial Research show apparatus used in research work (together with specimens), including the Gray-King low-temperature carbonization assay of coal, low-temperature tar, Bergenized coal products, specimens illustrating a study of the ash in coal, and records of experiments on domestic heating.

The University of Leeds (Department of Coal Gas and Fuel Industries) display figures of the Corbett-Woodall carbonization plant at the University, and sections and specimens of cokes from coal carbonized in this plant, showing the influence of size of coal particles on coke structure. A further exhibit has been prepared indicating the effect of the additions of inorganic compounds on the carbonization of a West Yorkshire coal.

The Lancashire and Cheshire Coal Research Association, whose work is carried out at the College of Technology, Manchester, have an exhibit representative of the research and routine work carried out by the Association.

The Manchester College of Technology Fuel Department divide their exhibit into two sections—the first illustrating the testing of refractory materials, and the second showing specimens of coke prepared in various plants, and polished to bring out their structure.

The Department of Applied Geology (Manchester University) have diagrams illustrating the lie of the coalfields of this country, and demonstrating the scientific method of tracing the "basins," with the object of the possible discovery of new coalfields.

MISCELLANEOUS.

The Thermal Syndicate, whose vitreosil products are now so well known, have a selection of pipes, bends, coils, burner jets, &c., including the new type of S-bend absorption vessel for the construction of plants for the manufacture of nitric, hydrochloric, and other acids and chemicals.

The Anglo-Persian Oil Company have arranged their exhibit in the striking manner which has become familiar to those whose duties or pleasures take them to the many exhibitions at which oil products are staged. In addition to a collection of products arranged in such a form as to show the regular progress of the refining process from the original crude oil to the final derivatives, there is an enormous globe of paraffin wax made from Persian crude oil.

Sir W. H. Bailey & Co,. Ltd., show their well-known two-stage air compressor and slide-valve type of vacuum pump, a direct action steam pump in operation, and a selection of acid pumps, valves, cocks, ejectors, &c.

Messrs. Baird & Tatlock, Ltd., in conjunction with Messrs. J. J. Griffin & Sons, Ltd., have one of their usual exhibits crowded with laboratory and testing apparatus, including apparatus for tar and benzole distillation, gas analysis, and calorimeters for gas, coal, and oil fuel, including Prof. Boys' calorimeter.

Exhibits in the nature of information bureaux are those of the British Chemical Plant Manufacturers' Association and the Society of Chemical Industry. Messrs. Thomas Broadbent & Sons, Ltd., have an interesting display of working models, showing various types of their standard centrifugal machine. Bolton's Superheater and Pipe Works, Ltd., concentrate chiefly upon their well-known coal-saving specialities, and the Crosthwaite Engineering and Furnace Company, Ltd., show their patent mechanical stoker and self-cleaning furnace.

Electroflo Meters, Ltd., have a comprehensive display of works instrument equipment, such as distance temperature indicators and recorders, pressure indicators and recorders, and low-pressure gas meters. A prominent feature is the electroflo (electrically operated) fluid flow meter for the measurement of high and low pressure gas, steam, water, &c. Filtrators, Limited, show their plant for the non-chemical treatment of boiler feed water; Messrs. S. H. Johnson & Co., Ltd., have a number of filter presses on view; Messrs. Hardman & Holden, Ltd., tar and ammonia distillers, have a selection of the products of coal tar; and Messrs. Allan Johnston & Partner exhibit specimens of their brands of bye-products from the coal and gas industries. Messrs. George Kent, Ltd., show, among a large collection of recording and measuring apparatus, the station venturi gas meter for measuring gas-works output, a shunt gas meter, and a district gas meter. The Lea Recorder Company, Ltd., show the Lea cubi-meter for continuously measuring supplies of coal in large or small quantities for gas-works, &c., as well as other coal meters of smaller dimensions.

Messrs. Meldrums, Ltd., exhibit a large number of acid-resisting metal centrifugal pumps, cocks, valves, &c. Special interest attaches to this material, which is too tough to be machined. Messrs. Richard Simon & Sons, Ltd., show a model of an automatic machine for continuous weighing of coal in bulk; and Messrs. Ronald Trist & Co., Ltd., feed water regulators and other boiler appliances. Victory Valves, Ltd., display an illustrative group of valves and boiler mountings; and Messrs. G. & J. Weir, Ltd., make a feature of a large mixing pan of ⅜-in. thick Monel metal, together with a Monel metal hydro-extractor, for the drying of sulphate of ammonia and other corrosive salts.

A number of firms, including the Woodall-Duckham Company, the National Gas Engine Company, and Messrs. Parkinson & Cowan, have models on view.

Glover-West Verticals for Colwyn Bay.—Minutes of the Lighting Committee adopted by the Colwyn Bay Urban District Council at their last meeting included a recommendation that a tender by West's Gas Improvement Company, Ltd., for coal handling, carbonizing, and coke storage plant be approved; and also one of Messrs. R. Dempster & Sons, Ltd., for a new tower scrubber.

Midland Association Meeting.—The Committee of the Midland Association of Gas Engineers and Managers have from time to time considered the holding of general meetings; but it has been felt that, under the present difficult circumstances, members have little time to attend meetings in Birmingham to consider technical matters. They have therefore now decided definitely to postpone all general meetings until the cessation of strike conditions. It will be necessary, however, to hold a formal meeting for the election of officers for the coming year; and this will take place at the Grand Hotel, Birmingham, at 3.30 p.m., on Thursday, Dec. 2. The meeting will follow immediately after a meeting of the Midland Commercial Gas Association.

WATSON HOUSE.

New Stores, Laboratories, and Training Shops of the Gas Light and Coke Company.

Some of the 470 Apprentices at present in Training, and ex-Apprentices who have passed through the Workshops since the Apprenticeship Scheme was introduced in 1909.

A Scientific and Technical Training Centre.

On Wednesday, Nov. 17, the Chairman of the London County Council, Sir George H. Hume, J.P., M.P., opened, at Battersea, "Watson House"—a scientific and technical training centre of the Gas Light and Coke Company, practically reproducing, in a modern form, all the best points of the old apprenticeship system, which gave every boy a chance to become a master of his trade. At Watson House, boys entering the gas industry from elementary and secondary schools will have the opportunity of eventually reaching high and responsible positions, without any initial advantages other than pluck, perseverance, and ability. This is the result of a quarter of a century's endeavour on the part of Mr. David Milne Watson, D.L., LL.D., the Governor of the Company, after whom the building is named. The commemorative naming of the Foundation is a small recognition of his many years' invaluable service.

The inauguration of Watson House is the latest achievement of the Company in furtherance of the policy of the gas industry as a whole—a national scheme which has been to a large extent inspired by the example of the Company.

The Gas Light and Coke Company has grown and still grows, not only in the area which it supplies—now 265 sq. miles—but in the amount of gas sold per head of population and the variety of the purposes to which gas is applied. The site at Horseferry Road which once accommodated both the offices and the manufacturing plant had, in spite of the removal of the works many years ago, become by 1925 very congested.

In January last, when the Brentford Gas Company was amalgamated with the Gas Light and Coke Company, it became urgently necessary to move some departments to new quarters.

The New Premises.

In view of the coming amalgamation, the Company had acquired in 1924 a magnificent factory built in 1906 for Messrs. Crosse & Blackwell in Nine Elms Lane to replace their factory on the site of the present County Hall. Imperial Wharf, as it was then called, had a floor area of some 146,000 sq.ft., and was well placed to serve as a central store. Situated within a few hundred yards of Nine Elms and Vauxhall goods yards, it had also a frontage to the river with jetties and cranes, as well as an excellent loading bank in the central yard.

Allocation of Building.

The Company's Chief Officer of Stores and his staff had for some time been housed in a building in Monck Street, Westminster, close to the main office in Horseferry Road; and it was decided that they and the central stores (there are also subsidiary bulk stores at Brentford and Stratford) should be moved to Watson House. From this centre is controlled the purchase of all stores for the Company's many departments—for the works, the distribution department, the gas sales department, the catering department, &c.—as well as small stores and stationery for all departments. Their allocation to the various bulk and sub stores is also controlled from here. The accommodation is designed to hold an average four months' supply of all stores.

The tools and stores used by the 4000 fitters and assistant fitters in the gas sales department are inspected and tested for quality and conformity to the standards of the Company's specifications, which are drawn up by the staff at Watson House guided by practical experience and laboratory tests.

The Scheme in Outline.

At Watson House training is given to three classes of employees under the gas sales department. First, some fifty boys of 14 to 15 years of age—fitter apprentices—are each year started on a five or six years' course of technical training combined with general education. The practical training is carried out in the machine shop, the smiths' shop, and the carpentry shop at Watson House, while the remainder of the course is given under the direction of the London County Council at the Westminster Technical Institute.

Secondly, pupils of 17 to 18 years of age are each year started on a more advanced five years' course of training in the work of the department. Here again, part of the training is given in the laboratories, shops, and demonstration room at Watson House, and part at the Westminster Technical Institute, where pupils study for the Diploma in Gas Supply of the Institution of Gas Engineers.

Thirdly, there are facilities for instructional courses for fitters and all ranks engaged in the supervision or execution of practical work in the department.

It is hoped largely to extend the instruction given; and it is of interest that, besides apprentices and pupils, many others in the Company take advantage of the scientific and technical classes—as well as of the general educational courses—provided at the various institutes in London. In particular, there are classes in gas fitting and gas supply, as well as physics, mechanics, chemistry, &c., at Chiswick, Hackney, East Ham, and Westminster.

The well-being of all who work at Watson House is cared for in many ways; and on the second floor are catering stores, a kitchen, and mess rooms. These provide standard meals of wholesome food at a low figure. In particular, apprentices can buy a nourishing and satisfying dinner for sixpence a day.

The building is a four-storey one. In the basement are a smith's shop, a cutting and screwing shop, an engine and compressor house, a boiler house, and storage room for heavy goods.

Barrel Testing.

The ground floor of the new building was first inspected. Here no less than 60 miles of barrel is stored. All barrel is tested for sand holes, &c., under water, at a pressure of 100 lbs. per sq.in.; and there are separate sections in the stores for long lengths and short lengths, each complete with testing bench. The magnitude of this department of Watson House will be appreciated when it is mentioned that the Company use 800 miles of barrel a year, and about 2½ million barrel fittings in the same period. The visitors passed through the hardware section, where asbestos flue pipes, meter shelves, and general ironmongery articles are stored, and were then taken in one of the lifts to the first floor.

A New Truck.

Here is the incandescent lamp fittings store. It was noticed that there was a large stock of outside lamps—one of the results of the coal stoppage and the subsequent lighting restrictions. On this floor also there are sections for tools, brass fittings, mantles and globes, and burners and brackets, and a truck making and repairing shop. It is to the latter that all damaged trucks from the district are brought. Attention was drawn to a new light-pattern truck recently designed and in course of construction—the outcome of a great deal of thought. The total weight of this new model is 2 cwt. less than that of the older type.

Inspection was then made of the third floor, where the work in connection with the apprenticeship scheme is being carried out. This floor naturally proved most interesting; and we intend to describe the various departments in rather more detail.

Old and New Gas Appliances.

Three entertaining exhibits in the fittings testing-room showed the advance which has been made in apparatus for gas lighting, cooking, and heating. In the gas cooker display,

Leoni's first stove (it was explained that the griller of this old appliance consumed 90 c.ft. of gas an hour) was contrasted with a "N.G.C." Standard eye-level cooker; while in the gas fire display, a Fletcher-Russell "Calcutta" fire and a heater with iron frets were contrasted with two particularly fine new models in pewter and copper. These new fires were of the "sheath" type—an attractive and durable pattern, and one easily repaired.

The Laboratories.

The Company's organization for the testing of stores and apparatus of all kinds used by the gas sales department occupies practically the whole of this floor. In the chemical, physical, and general laboratories, and in the demonstration room, the materials composing the stores and apparatus are studied, and problems of lighting and thermal efficiencies investigated. Tests are made and reports obtained not only on almost every type of appliance on the market, but on many in the experimental stage, whose inventors are anxious for advice. The interest of consumers to secure the maximum for efficiency and practical utility is also the interest of the Company; and these points and that of safety are carefully studied in considering the design and construction of apparatus.

In the chemical laboratory, the visitors were able to see how carefully tests on wrought iron are carried out; demonstration being given of an apparatus for the determination of manganese. In this laboratory, it was explained, nickel used for guards for high-pressure lamps is analyzed, brass tube is examined for its capacity of withstanding stress, solders are analyzed, estimation is made of lead in paint—to mention only a few of the many activities.

Exhibits in the Physical Laboratory.

In the physical laboratory, demonstration was given of the manner of testing mantles for their capacity of withstanding shock and pressure. The "temperature maintenance" test of

1.—Chemical Laboratory.
2.—Physical Laboratory.
3.—Physical Laboratory.
4.—Testing Barrel under Pressure.
5.—Main Workshop.
6.—Apprentices at Work in Gasfitting Shop.

a gas cooker, formulated by the Institution of Gas Engineers, was actually in progress, and was explained. There was an exhibit of a new type of street lantern designed to equalize the degree of illumination between lamps; and another interesting apparatus in the lighting section was a street photometer mounted on a carriage. Perhaps, however, the exhibit which attracted most attention in this laboratory was a gas fire designed to increase the amount of convected heat. The height of the flue above the fire is increased, and being vertically disposed constitutes a hot panel; and the air which comes in contact with this panel is warmed, but not to too high a temperature. A test for the radiant efficiency of a gas fire was in progress. The Company, in their investigations, have the experience not only of the manufacturers of appliances, but also of the men on the district, and are thus able to arrive at what the consumer actually wants, and the best line of attack to satisfy this demand. The visitors were highly interested in a sensitive recording millivoltmeter.

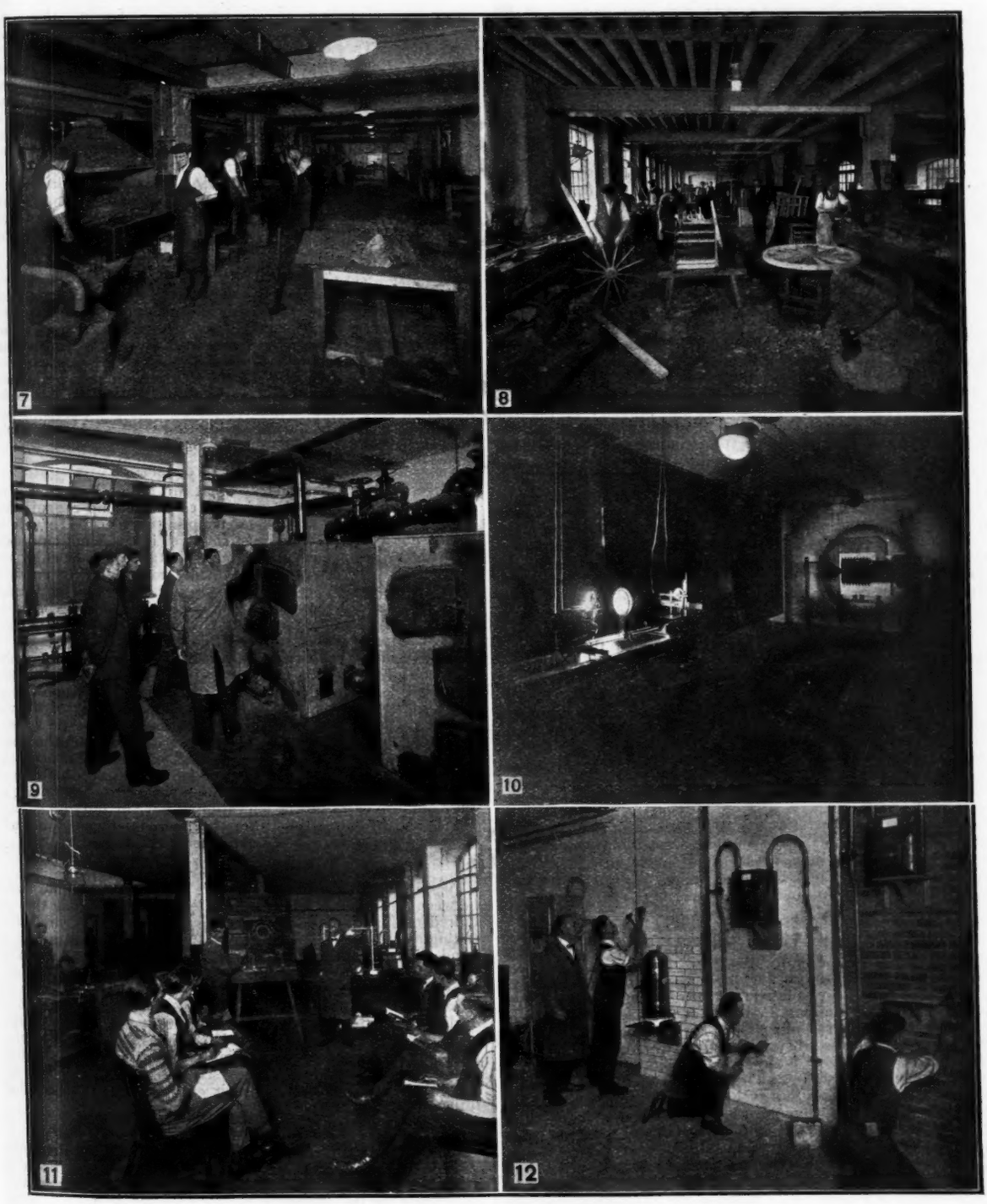
TRAINING SHOPS.

Then came what was, it is thought—from a general point of view—the most interesting part of the tour of Watson House. This was an inspection of the shops where the apprentices are trained. All these, which include smiths' shops, carpenters' shops, and lamp and tool repairing, sheet metal work, and brass finishing sections, are on the third floor. With regard to hot water apparatus, all types are fitted ready for testing purposes in a separate room. In this room there is an exhibit of geysers, from the old patterns to the most modern, cut into sections to show clearly their construction. In this room, too, ventilation tests can be made.

In another room—the fitters' training shop—apprentices were engaged fixing fittings and shelves on sections of wall of various types. One of the accompanying illustrations shows this.

AN OPTICAL PROJECTOR.

The visitors then passed on to the lecture hall, where a highly



7.—Blacksmith's Shop.
8.—Truck Repairing Shop.
9.—Testing Boilers.
10.—The Optical Projector.
11.—Assistant Fitters attending a Lecture.
12.—Practical Training in Meter Fixing under Various Conditions.

interesting optical projector was demonstrated. This projector is used for examining threads, &c. The screwed fitting is placed in a powerful beam of light, and this beam is thrown on to a screen, where an image, fifty times the size of the actual fitting, is seen. In this way the slightest defect in the thread is at once apparent. The stores have to purchase large quantities of wrought-iron tubing; and it is necessary to ascertain whether this tubing is up to standard, and will produce a good thread. The efficiency of dies can also be tested by this apparatus. It has also a further useful function in that it permits the Company to examine the workmanship of their apprentices and, if necessary, of their fitters generally.

Flame Temperature.

Before passing down to the second floor, the visitors saw a demonstration of how flame temperature affects lighting burner efficiency. It was explained that the hotter the flame, the greater the efficiency of the incandescent burner, and that in a gas fire a 1 p.ct. increase in flame temperature brought about, following Stefan Boltznann's law, a 4 p.ct. increase in the emission of radiant energy. As for lighting, the same increase in flame temperature resulted in a 12 p.ct. increase in lighting efficiency. The exhibit included a range of burners. First of all there was a flat-flame burner, requiring 300 B.Th.U. per candle-hour. This was followed by an argand burner, requiring 200 B.Th.U.; a "C" upright incandescent burner, requiring 35 B.Th.U.; a "Kern," consuming 30 B.Th.U.; an ordinary inverted, requiring about 25 B.Th.U.; a superheated inverted burner, requiring 16 to 18 B.Th.U.; and finally a high-pressure inverted burner consuming only 10 B.Th.U. per candle-hour. There was also a practical demonstration of metal cutting by the oxy-coal gas flame, which attains a temperature of 4000° Fahr.

The tour of inspection was brought to an end by examination of the mantle section on the third floor; and then the visitors assembled for luncheon on the second floor, at which Mr. Milne Watson presided. After the Loyal Toast,

Need for New Premises.

Mr. Milne Watson, on behalf of the Directors of the Gas Light and Coke Company, welcomed those present. He regretted that, owing to illness, the Duchess of Atholl, the Parliamentary Secretary of the Board of Education, and Mr. Betterton, the Parliamentary Secretary of the Ministry of Labour, were not with them. They were, however, honoured by the presence of Sir George Hume, the Chairman of the London County Council, and Mr. Percy Ashley, of the Board of Trade. The London County Council and the Board of Trade were really their official sponsors in life; they lived, moved, and had their being under the guidance of these two bodies, who would, perhaps, regard the new enterprise of the Gas Light and Coke Company as worthy of their tutelage. The Company had grown out of their premises at Horseferry Road—the historic home of the gas industry after the granting of the Company's Royal Charter in 1812, in the reign of George III. The first street to be lighted by gas was Pall Mall, in 1807; and after 119 years, it was still illuminated by the same means.

The site of the building they had inspected that day was formerly occupied by Messrs. Crosse & Blackwell. As those present had been able to see exactly what work was being carried on in the new premises, he would not enter into detail; but he would say a few words concerning the general principles which influenced the Directors. They felt strongly that it was absolutely essential to good workmanship and sound business that the staff should be thoroughly efficiently trained. Rule-of-thumb methods were rightly coming to an end. As far as the Gas Light and Coke Company were concerned, they had long realized the ineffectualness of such methods, and were anxious to provide better and still better facilities to enable their workmen to gain a real knowledge of their work. This knowledge not only enabled a man to deal more efficiently with consumers' difficulties, and give them lasting satisfaction, but it engendered pleasure in, and respect for, his work.

Thorough Training.

In the new building, they proposed to continue the training of apprentices; and this training was to be given to three classes of employee. First, they took each year about fifty boys of 14 to 15 years of age, and started them on a five or six years' course of technical training. At present there were 143 boys in training under this scheme. Since the Company started the apprenticeship scheme, they had dealt with 468 boys, and, of these, no fewer than 57 had obtained positions on the staff—*i.e.*, the supervising staff—of the Company, and nine had also become teachers of Gas Supply in the Technical Institutes attended by their fellow employees. In the operation of their apprenticeship scheme the Company had found of great value the able and willing co-operation of the London County Council, who had from the first interested themselves in it, and had provided facilities at the Westminster Technical Institute. At the outset the boys attended classes at the Institute during the day, and towards the end of their course in the evening; and the time thus spent was paid for by the Company. Then there were instructional courses for ordinary fitters, the importance of whose work could not be overestimated.

The idea of training these youths and fitters was not only to give them technical and practical instruction, but to assist their general education by teaching them English, arithmetic, and so on. And, said Mr. Milne Watson, he would stress the importance of a good knowledge of English. There was no more common cause of complaint than the fitter who could not express himself clearly both in speech and in writing. He should, for example, be able to write a readily understandable report; otherwise he became a source of expense. The origin of many disputes could be traced to lack of a knowledge of English.

Coping with Rush Periods.

Then, continued Mr. Milne Watson, there was another difficulty. The Company's activities were subject to rush periods, when, at a particular time, people awakened to the fact that they needed gas appliances. Consumers were really aware that winter was cold; but, instead of ordering their gas fires during the summer or early autumn, they waited till the cold spell was upon them. When this happened, they descended in a body upon the Gas Company. [Laughter.] During these rush periods the Company experienced great difficulty in coping with the work. To overcome it, however, they proposed to have an intensive course of gasfitting for gasfitters in London who were not regularly employed by the Company. Thirdly, they were taking boys from the public schools, and giving them a course of training which would fit them for responsible posts in the outdoor department—a department in which no fewer than 6000 men were now employed. They required competent men to fill positions of trust and importance. Nor did the work of the Company end there. With regard to the engineering side of their vast concern, the Company were in close touch with Oxford and Cambridge and the Modern Universities; and graduates from the universities were trained practically for their engineering and scientific tasks.

Co-Partnership.

Finally, remarked Mr. Milne Watson, he would refer to the Company's co-partnership scheme. There were now between 13,000 and 14,000 co-partners, who held no less than £500,000 of the ordinary stock of the Company. It was no use preaching the blessings of capital, if employers kept all the capital to themselves. [Laughter.] There were also a pension scheme, a war memorial fund, and a great sports association catering for the leisure hours of their employees—for the Company fully realized the truth of the old saying that "all work and no play makes Jack a dull boy."

Loyalty from Two Aspects.

Sir George Hume remarked that Mr. Milne Watson had referred to the Company's splendid co-partnership organization. Co-partnership constituted a tempting subject. Though he would not dwell on it, he must say that, in the conditions under which they were now living, no undertaking could enjoy success without the sympathy and loyalty not only of the employee to the employer, but of the employer to the employee. ["Hear, hear."] And all those who took a lively interest in industrial affairs of to-day must appreciate how greatly the Gas Light and Coke Company had encouraged this excellent feeling.

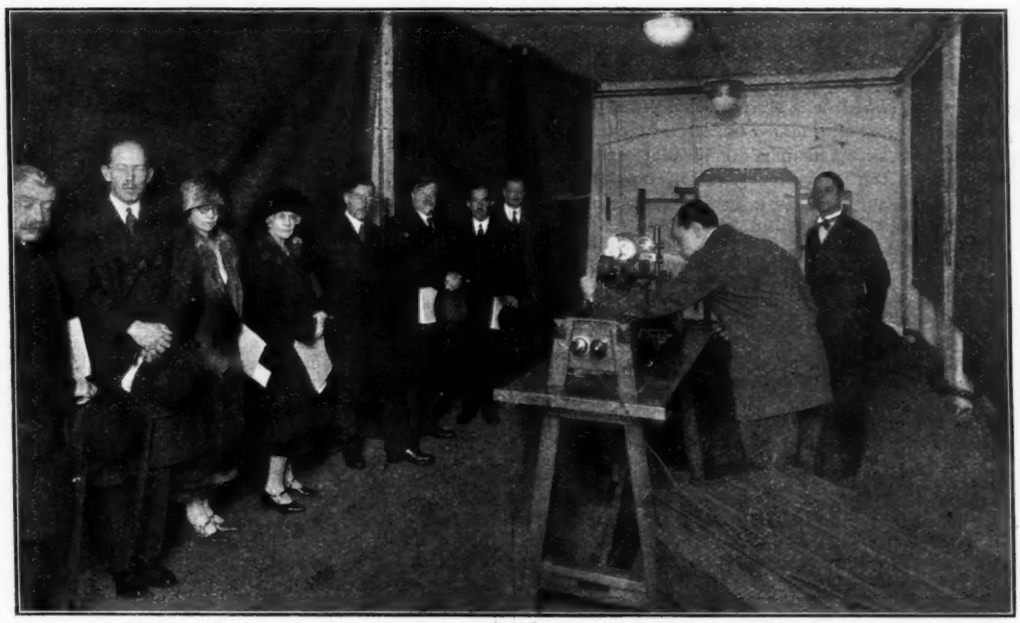
To-day much criticism was heard of the methods of education and of the results of these methods. They were told that they failed because lads leaving the elementary schools at 14 years of age were not up to the standard required of them in industry. If, said Sir George Hume, the great public schools, such as Eton, Harrow, and Rugby, were to turn out their boys at the same age, subject them to similar home influences, and allow them to run free for six months, the results would be no better. ["Hear, hear."] Education authorities were doing all they could to carry on the education of boys by offering scholarships, and by harvesting from the mass intelligent lads, who were sent to central schools until the age of sixteen.

Bridging a Gap.

In spite of all this, however, there was an unfortunate hiatus between the standard of the boy leaving school and that required of him in industry. It was here that such an undertaking as the Gas Light and Coke Company held out a helping hand. Their admirable system afforded practical and technical training, and also aided the boy's general education. The Company were to be congratulated on their pioneer work with regard not only to the supply of gas, but also to their methods of dealing with the labour problem. They were unquestionably wide awake to the necessities of the times. Their new enterprise was, he hoped, the beginning of a path of progress which would bridge the hiatus between school and industrial life, and would widen the horizon of their employees and ensure their future welfare.

A Tribute to the Gas Industry.

Mr. Percy Ashley, in proposing "The Health and Prosperity of the Gas Light and Coke Company," said that the Board of Trade were closely concerned with the gas industry, and were responsible for the administration of a variety of Acts of Parliament relating to the industry. One of the purposes of the Board of Trade was to promote—as far as a Government department could promote—the well-being and progress of the industries of the country; and among these industries, that of



Mr. D. Milne Watson and Party during their Tour of Inspection of the Modern Workshops and Laboratories at Watson House, Nine Elms Lane, which Sir George Hume, M.P., Chairman of the London County Council (on left of the Governor), opened on Nov. 17.

gas held a position not yet realized by the general public. The Gas Light and Coke Company, with its vast organization and the wide range of its activities, was the outstanding concern in the industry. He was speaking not merely as a representative of the Board of Trade, but also as a consumer living in the Company's area of supply; and he would express his appreciation of the way in which the Company discharged its obligations. All they knew about the Company made them realize that the gas industry was not only striving for that efficiency so desirable in these days of intensified national competition, but was attaining it. With the toast he would couple the name of Mr. Milne Watson. A captain got from his team the degree of work he deserved; and the efficiency of the Gas Light and Coke Company was certainly a tribute to the inspiration of its Governor. Mr. Ashley concluded his remarks by expressing, on behalf of the Board of Trade and of other Departments of State, appreciation of the help which Mr. Milne Watson had given them in many matters.

Mr. MILNE WATSON, in the course of his reply, said that the gas industry owed a debt of gratitude to the Board of Trade for its assistance in difficult periods; and he felt sure that this help would be extended in the future.

SULPHATE PROPAGANDA BY NOVEL MEANS.

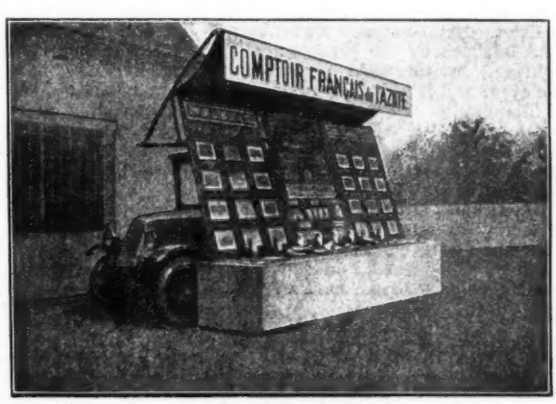
[From the "Journal des Usines à Gaz."]

The French Nitrogen Bureau last June put into commission an Exhibition Car to intensify their propaganda directed to the development in France of nitrogen fertilizers, and particularly sulphate of ammonia. A 10-H.P. Renault chassis with internal drive, capable of doing about 22 m.p.h. with a load of one metric ton, was fitted up for display purposes, and with cinematograph outfit and electric generating plant. The display outfit, as may be seen from the illustration, consists of three panels 2 m. high and $1\frac{1}{8}$ m. wide, in three-ply wood, and a table formed by two planks to which are attached four folding tressles. The table being attached along one side of the car, the panels were fastened to it and the body; and finally a removable lean-to was erected over the whole.

On the left-hand panel the manufacture of fertilizers is displayed by means of four pictures relating to sulphate of ammonia, four to cyanamide, and four to new manures. On the central panel, pictures and diagrams call the farmers' attention to the fact that 20 kg. of nitrogen will increase a wheat crop by about 4 cwt. On the right-hand panel, twelve pictures are devoted to various uses of nitrogen fertilizers; eight showing the results of experiments on different crops, and four dealing respectively with consumption, analysis, mixing, and the organization of experimental fields. On the table are set out samples of the different fertilizers and resulting produce, leaflets, &c.

This travelling outfit clearly offers the possibility of organizing in a very short time a stand suitably equipped for small agricultural exhibitions where it is difficult to find on the spot the necessary materials. The motor is driven by a chauffeur who is also able to work the cinema and supervise the exhibits; and an engineer capable of lecturing and giving general technical information goes with him.

The itinerary is mapped out with an eye on the various fairs and markets; the object being to set up each day in the market place of a different town. It has been found that in this way the attention is attracted of small farmers, who seek information and invariably go away with a leaflet which in particular directs them to communicate with the Local Propaganda Bureau; and it may be mentioned that good audiences invariably attend a lecture followed by a cinema display. Tours have already been undertaken in the districts of Caen, Tours, Paris, Lille, Strasbourg, Dijon, Clermont-Ferrand, and Lyon.



The work accomplished in five months is worthy of record. In spite of the harvest time being unfavourable for the meetings, seventy important localities have been worked, and more than 4000 farmers have attended the lectures, while a very much greater number of inquiries have been received.

Tankless Gasholders.—To recently published opinions regarding "dry" gasholders may be added that of the "Swiss Gas-Works Inspectorate." They say: As regards the recent explosion (abroad) of such a holder, the Inspectorate have to report that in the modern design considerable improvements to the disc and to the methods of control have removed all fears for the future.

FIELDS AND MERITS OF GAS AND ELECTRICITY.

An Efficiency Club Debate.

The Efficiency Club (which was started some years ago by a group of professional and business women) is a club whose members are primarily occupied in administrative, specialized, or organizing work in the professions, crafts, and public services generally. While its object is to draw together in closer association women who are engaged in responsible work, it has gradually become more and more apparent that it affords an eminently suitable meeting ground for the discussion and consideration of many of the important subjects and questions of the day—subjects and questions as widely differing in scope and aim as the professions and daily experiences of the Club's own members.

One of these discussions took place last Friday evening, in the Club rooms at Vernon House, Park Place, St. James', S.W.; and as it was an open night, a number of visitors were enabled to learn something of the delightful atmosphere in which the members transact their business. On this occasion there was a discussion upon "The Relative Fields and Merits of Gas and Electricity"—not as the strictly impartial Chairman, Mrs. M. L. Matthews, I.E.E., was careful to point out, "the rival fields of gas and electricity," or "gas *v.* electricity"—and it arose from the fact that among the members of the Club are ladies of distinction and repute in the respective fields of gas and electricity. On the gas side, as the Chairman stated, is Mrs. Cloudesley Brereton; while the other of these two history-making servants of civilization is equally well represented.

SERVICE OF GAS TO THE COMMUNITY.

Mr. F. W. Goodenough, C.B.E., had undertaken to speak for gas; and he began by remarking that fully 90 p.ct. of the work of both gas and electricity is not competitive, but complementary. No one power, as Edison said, can do everything; and there is a great field for more than one of the forms in which the latent energy of coal can be placed at the disposal of mankind. As to the development of the application of gas to the service of the community within recent years, the speaker pointed out that in the ten years ended 1912 the average annual increase in the output of gas in this country was 4000 million c.ft. In the next ten years, ended 1922, in spite of the war, the average annual increase went up from 4000 to 6000 million c.ft.; while in the three years following that, the average annual increase in the output of gas went up again from 6000 to 10,000 million c.ft. The many fields for electricity were enumerated by Mr. Goodenough, who pointed out that the gas industry itself makes extensive use of electric power in its works.

In the lighting field, he continued, electricity has, of course, an enormous place; but wherever cost is the prime factor taken into consideration by the user, gas holds the field very easily. It is quite a wrong idea that, because electricity is the light of the well-to-do, every working woman ought to have it, whether she wishes to or not. The working woman wants value for both sides of the penny; and if she needs light and heat at the same time, she would rather pay for one source than for two sources. His Company find that, of the 600,000 consumers who buy gas by the pennyworth, about 99 p.ct. use gas for lighting. Another thing is that insufficient lighting is bad for the eyes; and it is unkind to give the working woman a source of illumination of which, at present prices, she cannot afford to use enough. Electric light has undoubtedly a great future; but those who have, for example, to deal with housing questions should always bear in mind that, at any rate, there are two sides to the question.

Then comes the big subject of heating; and it is in the field of energy in the form of heat that gas has the chief place. There is no cheaper form of labour-saving fuel than gas. The applications of gas in industry are increasing by leaps and bounds. There have been catalogued some 3500 trades using gas, on an average for seven processes per trade. "What," asked Mr. Goodenough, "would have happened if the gas supply had failed during the last seven months? People do not fully realize what they owe to the gas industry for the unfailing supply of gas, unaltered in quality and at full pressure, which they have enjoyed while coal mines have been shut-down all over the country. It has meant a great deal of anxiety to the industry, and much activity in buying coal from America, Canada, Calcutta, Silesia, and all parts of the world. It must be remembered that our troubles will not end with the finish of the coal strike; but if people do not make too great demands upon us for gas, we shall hope to get through the winter quite well." Mr. Goodenough went on to say that he sees no prospect whatever of the gas cooking field being invaded in any serious degree by our friends of the electrical industry. His Company have been increasing the number of cooking stoves on the district at the rate of something like a thousand a week; and they are unable to discern any sign of a decline in the popularity of gas for cooking purposes in all classes of dwellings, from Buckingham Palace to Bethnal Green.

After some remarks from the point of view of hygiene, Mr. Goodenough concluded: "I believe there is a very great future before the electrical industry—though not so great as some of the politicians have led the public to think—and I believe also there is a very great future before the gas industry."

THE ELECTRICAL FIELD.

The fields and merits of electricity were then ably explained by Miss C. Haslett, Director of the Electrical Association for Women, who said that, in her opinion, electricity can do a great deal to solve the two great problems of the day—coal and unemployment. Electrical equipment is going to play a tremendous part in improving coal-getting; while it is hoped that in time it will be possible to use very low-grade coal for generating purposes. As to unemployment, if the Electricity Bill goes through Parliament, there will be a rapid increase in electrification throughout the country, which will mean much more employment. She stressed the importance of electricity in the remedial field. She is also convinced that it is going far to solve the problems of the former; that it can give the countryside some of the many advantages that the town now enjoys; and that in various directions it will help the arts and crafts.

Miss Haslett, in the course of her remarks, referred to the great progress that has been made recently with the electric furnace, and to electric lighting, cooking, and heating.

TENANTS SHOULD BE GIVEN A CHOICE.

A contribution to the debate which was both topical and practical was made by Mrs. Laura A. Willson, M.B.E., who was described on the notice of meeting as a House Builder. She told her audience that she builds houses to sell; and she is strongly in favour of the housewife being permitted to choose which kind of service she wants. This, however, is an attitude which appears to be not always acceptable to the local authorities. There is a tendency on the part of some committees to push one service as against another; and this Mrs. Willson regards as a great mistake, and bad business policy. But it is a trouble which it is not always easy for the builder to overcome, as so many services are in the hands of municipalities, who are at an advantage. With this liberty of action allowed to the tenants in her first housing scheme, the figures were: 70 p.ct. chose a gas oven; 20 p.ct., a coal oven; and 10 p.ct., an electric oven. One person wanted gas as an illuminant; and she had it.

At the close of a general discussion, Miss Haslett alluded to the relations between employers and employees in the gas industry as being splendid, owing largely to the fine co-partnership schemes in existence.

The principal speakers were cordially thanked for their contributions to the discussion, on the proposition of Dr. Winifred C. Cullis, M.B.E., the President of the Club.

DRY PURIFICATION.

We have received from the well-known firm of Friedrich Lux, Ludwigshafen on the Rhine, a very interesting coloured cartoon (from a painting) purporting to represent "The Dance of the Atoms in the Dry Purification of Gas"—in other words, the familiar chemical equation:

$$3H_2S + 2Fe(OH)_3 = 2FeS + S + 6H_2O.$$

The artist succeeds in presenting an impressive picture of the contra-dance and the resulting rearrangement of partners.

Sulphur is appropriately depicted as a brown devil (should he not have been yellow?) with a swishing **S** tail, hydrogen as a young demure lady in white dress, oxygen as a matron in green costume, and iron as an armour-clad knight. The individual atoms of a kind are similar but apparently of varying disposition. (We wonder if this is really so.)

It is evident that the artist is not seeking to portray modern times, for the dresses speak of old, forgotten, far-off days, when they nearly swept the floor, and when bobbing and shingling were unknown.

In the left-hand picture we find three trios, each composed of two maidens in the company of one devil, the latter tripping a fantastic toe, advancing to change partners with two groups each composed of three maidens and three matrons (chaperones, we presume), escorted by a knight.

The result of the old dance, which modern manners have not yet succeeded in displacing, is shown in the right-hand picture, where, still dancing but somewhat dejected-looking, the devils have parted from the maidens. Each of the two knights (bayonets fixed, so to speak) has taken a poor devil in charge; one lucky devil has escaped and is enjoying his freedom; while the matrons look serenely happy in the possession of two maidens apiece.

SOME PHASES OF CORROSION.

By R. H. RUTHVEN, of Ramsgate.

[A Paper read before the Southern Association of Gas Engineers and Managers, Nov. 12.]

It is a truism that the metal iron in one form or another is the material most used by engineers in the construction of their works, and, further, that immediately iron has been converted from its native oxide into useful engineering material it endeavours as rapidly as possible to revert to its original oxides. Sir Robert Hadfield has been quoted many times to have estimated the cost of corrosion in this country at £700,000,000 per annum. However any man had the temerity to commence to assess the cost of corrosion is a source of wonder to me. The figure given may be quite accurate; and, at any rate, it does focus attention on the enormous importance of the subject. Moreover, we must bear in mind the fact that from 4 to 5 tons of fuel—coal or coke—are used to produce 1 ton of steel. Prevention of corrosion therefore bears an important part in the conservation of our fuel supplies.

The gas industry is very intimately concerned with problems of corrosion, as iron and steel enter into the construction of almost all our buildings. The most expensive individual pieces of plant on our works—namely, gasholders—are entirely constructed of iron or steel; and we distribute our manufactured goods—*i.e.*, therms—entirely through steel or iron pipes. And, as will be stressed later, we are dealing all the time with conditions that are favourable to corrosion. Taking the latest "Gas World" analyses of municipally and privately owned gas undertakings, I find that the cost of repairs and maintenance of works and mains and services is as follows. (I have reduced the municipal undertakings to the therm basis on an assumed average calorific basis of 475 B.Th.U. gross per c.ft.):

—	Repair Works.	Repair Mains and Services.
Municipal undertakings	1·05	0·40
Gas companies	1·50	0·69
	2·55	1·09

$$\frac{3.64}{2} = 1{\cdot}82\text{d. av.}$$

I have endeavoured to arrive at what proportion of this 1·82d. could be debited to corrosion, but have been unable to do so. I feel, however, that 10 p.ct. would be a conservative estimate. This may not seem an excessive figure; but it does not by any means represent the total cost of corrosion. We must not, for example, overlook the fact that such structures as gasholders are constantly depreciating by reason of corrosion; and when the holder is replaced, the cost may be borne by the capital account.

INITIATION OF CORROSION.

While it is essential to have as clear an understanding as possible of the theories of the initiation of corrosion, it is impossible to discuss the matter in any way fully in the scope of a short paper. It is only in recent years that anything approaching a sound fundamental knowledge of corrosion has been attained. The matter has, however, been boiled-down to two principal theories, the acid and the electrolytic; and I propose to mention these two as briefly as possible. Regarding the initiation of corrosion, the acid theory presumes that the presence of an acid—however weakly ionised—is necessary; whereas the electrolytic theory presumes that even the purest water must contain free hydrogen ions in a definite amount—one gramme in 10 million litres—and that this minute concentration is sufficient to initiate the process. Carried beyond the point of initiation, there is general agreement that corrosion continues electro-chemically.

Pollitt, in his book "The Causes and Prevention of Corrosion," shows how closely the two theories agree after initiation, and states the opinion that it is futile to continue from the practical point of view the controversy between the two theories, and logically that there can be no useful purpose served from the point of view of the preservation of our metals. Figs. 1 and 2 are reproductions of Pollitt's graphic representation of the acid and electrolytic theories. Fig. 1 shows the acid theory. First the iron is acted on by the acid:

$$2Fe + 2H_2CO_3 = 2FeCO_3 + 2H_2$$

Then the ferrous carbonate formed is oxidized to the insoluble ferric hydroxide, which is precipitated with the liberation of the original amount of acid:

$$4FeCO_3 + O_2 + 10H_2O = 4Fe(OH)_3 + 4H_2CO_3$$

And so long as the supply of oxygen is present the process will continue. Fig. 2 represents the electrolytic theory. Iron ions shoot off the surface of the metal into the water, and the polarizing film of hydrogen gas is formed. In stage 2, therefore, the liquid is virtually a solution of ferrous hydroxide. The ferrous ions are then oxidized and precipitated as rust, and the surface of the metal is depolarized by dissolved oxygen. We are now "as we were;" and the whole cycle is repeated, unless some agent is introduced to upset it.

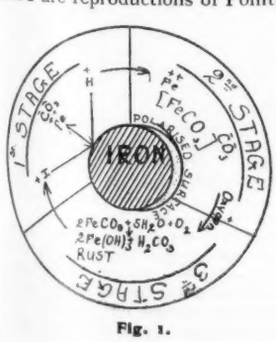


Fig. 1.

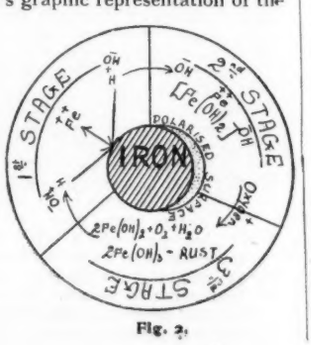


Fig. 2.

ELECTRO-CHEMICAL MECHANISM.

The reagent "Ferroxyl," prepared by Cushman & Walker, is a most valuable aid to an understanding of the electro-chemical mechanism of corrosion. The method of preparation of the reagent and its use were described in the report of the Wrought-Iron Tubing Committee presented to the Institution of Gas Engineers in 1925. Photographs of pieces of iron in this reagent were also reproduced. I have, however, some specimens with me. These, perhaps, will give a better idea of the use of the reagent, as it is difficult to reproduce the colours in photographs. The blue areas are positive, or anodic, and are produced by the interaction of the ferrous ions with the potassium ferricyanide used in the preparation of the medium. In these areas iron is passing into solution. The pink areas are negative or cathodic; the colour being obtained from phenolphthalein, also introduced in the preparation of the "Ferroxyl." This method of illustrating the electro-chemical process of corrosion appeals to me strongly. By its use, it can be proved that there are points of different potential in even the purest iron, and that from these points corrosion will commence.

PROF. COBB'S EXPERIMENTS.

In a paper on "The Influence of Impurities on the Corrosion of Iron," published in the "Journal of the Iron and Steel Institute" for 1911, Prof. J. W. Cobb used "Ferroxyl," and arrived at some results which concern us very closely. Prof. Cobb's experiments were made on the following lines:

A piece of iron measuring 3 in. by 1 in. by 1½ in., cut from a flat bar, machined, and roughly polished on emery, and a piece of ball-furnace cinder (silicate of iron) cast into the same size and shape, were hung in a beaker (fig. 3), and connected externally by copper wire through a galvanometer of 84 ohms resistance calibrated in millivolts. The beaker contained the "Ferroxyl" indicator; and as soon as the circuit was completed, a strong current flowed (above 17 millivolts indicated), slowly falling as the jelly set, until, after 45 minutes, 8 millivolts was registered. The gelatine around the iron began to turn blue, and after a time a pink halo surrounded the slag.

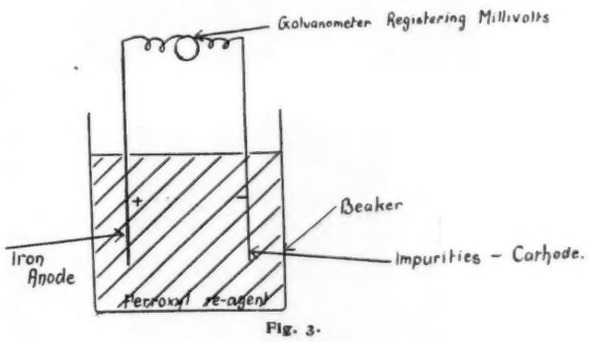


Fig. 3.

With reference to this phenomenon Prof. Cobb says: "It became clear that when silicate of iron (slag) and iron are in electrical contact, and immersed in an electrolytically conducting medium, the iron is definitely electro-positive to the slag, a current flows, and the iron goes into solution." That there was also a strong local current flowing in the iron is shown by the fact that there was a pink ring on the iron immediately below the surface of immersion, while just below this was a deeply corroded strip with a brown crust. Other impurities, such as mill-scale, iron sulphide and phosphide, and also various alloys of iron, gave similar results to the above.

I want particularly to refer to the test made using graphite as the cathode. The voltage registered on the galvanometer was 100 millivolts; and Prof. Cobb says with respect to this:

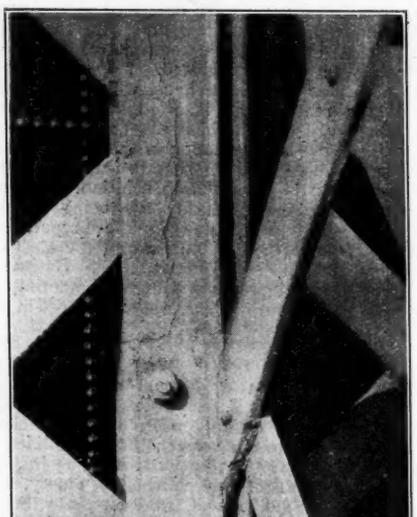
"One impurity of iron which gave a strong electrical current with iron in the indicator ('Ferroxyl') was graphite—deep halos formed rapidly. This impurity is distinguished by its occurrence in iron in the free form. As a prominent constituent of grey cast iron, the graphite plates would evidently be so many active corrosion centres, if the matrix of the cast iron resembled pure iron in its effects with graphite. An experiment was made to test this point by setting in the indicator a graphite pencil connected with a piece of refined iron, which may be taken as representing tolerably well a white iron, or the matrix of a grey cast iron. The results were decisive. A strong current (100 millivolts) passed, the gelatine around the iron rapidly became blue, and a distinct pink halo formed around the graphite pencil. It is therefore easy to see why a decayed cast-iron pipe, attacked by acid or any other strongly corrosive agent, leaves behind a skeleton largely graphite."

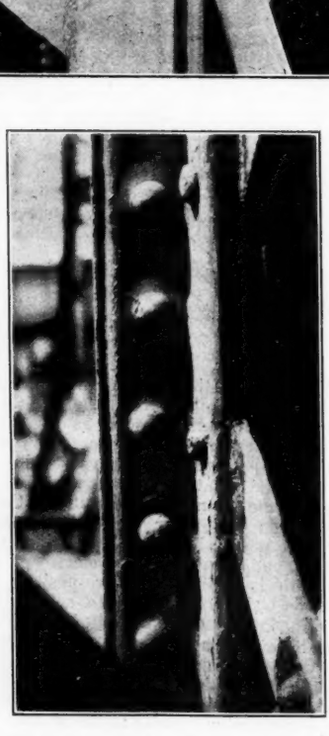
T. Steel found that a cast-iron pipe originally containing 2·76 p.ct. of carbon as graphite, after corrosion by fresh water gave 8·69 p.ct. of graphitic carbon.

Prof. Cobb also obtained a strong current with breeze and coke in the place of the graphite pencil; but with coal, pitch, and completely burnt ash there was no trace of current.

Gas-Works Structures.

In the gas industry we have to deal with the external corrosion of our iron structures, where we have the corrosive in-





fluences of the atmosphere, together with those stimulants of corrosion the differences of potential which abound almost everywhere in the iron sheets, girders, and so on, composing our works. We have internal influences, owing to the presence of carbon dioxide, oxygen, and liquid water present in the gas; and underground we have the influence of salts in the soil which, in certain circumstances, form a good electrolyte. There is small wonder, therefore, that, unless we make use of every possible means to negative these forces, corrosion will represent an increasingly heavy item of expenditure. It will, I feel, also have to be admitted that, when iron structures are designed, sufficient attention is not given to the question: "Can the whole surface of the metal be reached with a paint brush and thoroughly painted?" In roof design, for example, it is quite common to use two angle irons back to back, with the other roof members riveted between them. If it is necessary to use such a design, it seems to me that the space between the angles should be filled up with some material—such as a pitch or bitumen that remains plastic when set—as it is impossible properly to protect the backs of the angles against corrosion. Below I give a photograph of a section of a column of a gasholder.

All the framing of this holder is lattice work composed of angle irons and flats. It will be observed that the flat cross members are riveted between two angle irons, and that the space between the angles is not filled in with packers. It is quite impossible to paint thoroughly between these angles; and the resulting corrosion has, in some places, increased the thickness of the flats, thus forcing apart the angles and bursting off the heads of the ¾-in. rivets. Corrosion between the back of the channel iron guides and the flat cross members became so serious that, taking each column in turn, the channels were taken down, all the rust was taken off, and, after straightening, the channels were replaced. It was found that several of the channels were 1 in. ouf of the straight in their length—about 30 ft. If each of two opposite columns has its guide channels forced out of position 1 in., the effect is, of course, to reduce the original dimension between the path of the holder rollers by 2 in., when obviously there must be an enormous strain on the crown of the holder, or something must be broken; or, alternatively, the holder may be held up, and possibly cause a serious accident. My experience with this framing has convinced me that, wherever it is possible, simple rolled sections—*i.e.*, H beams and channels—should be used, even if the initial cost is slightly higher; my whole point in this connection being a plea for simplicity of design, and a due remembrance that if a structure is worth erecting, it is worth preserving, and the design must be such that it is possible to do this.

Effect of Oil Filming in External Corrosion of Holders.

When I took up my appointment at Ramsgate in 1922, I found that both our holders—total capacity 1,250,000 c.ft., were corroding externally at a very rapid rate. Owing to force of circumstance during the war, painting had been neglected, and severe corrosion had commenced. Efforts had been made to stop it by painting; but the trouble was that corrosion was going on behind the paint to such an extent that with care rust could be scaled off the metal in pieces up to approximately 4 in. to 6 in. square, and varying in thickness from $\frac{1}{32}$ in. to $\frac{1}{16}$ in.; the paint on the surface being sound, as far as could be seen. The holders were also largely coloured with prussian blue. A sample of the water from one of the tanks was sent to Prof. Cobb for examination; and his report was as follows:

> The sample was contained in a Winchester quart bottle, dated July 20, filled with almost clear and colourless water, from which only a slight flocculent deposit had separated. It had a faint smell suggestive of cyanides. It was nearly neutral, but slightly alkaline to litmus.
>
> The analytical results obtained were:

	Grms. per Litre.
Total solids	0·53
Total inorganic residue after ignition (largely lime)	0·35
Total ammonia	0·26
Sulphur compounds as sulphuric acid	0·103
Sulphides	Absent
Carbon dioxide	0·32
Cyanide as HCN	0·063
Ferrocyanide	Trace
Sulphocyanides	Trace

> Some comparative tests on corrosion were made by suspending two strips of mild steel, one in 250 c.c. of the sample, and the other in 250 c.c. of Leeds tap water (almost neutral moorland water known to have a very corrosive action on iron). During the daytime, the strips were lifted out of the water for exposure to air to reproduce to some extent the conditions to which holder plates are exposed; and this was continued for a week.
>
> The corrosive action of the sample was very marked. After two hours, a blue discoloration was perceptible in the water, showing that the cyanides had attacked the iron, with the production of prussian blue. After standing overnight, a marked blue precipitate had settled out. Corrosion of the other strip had taken place, with the formation of a red rust, though probably to a less extent. It was noticeable that the rust adhered to the surface better than the blue in the holder liquor.
>
> After one week, it was evident that the deposit of rust in the tap water experiment had become the larger. This was confirmed by weighing the ignited residue—mainly oxide of iron, filtered from the two vessels. This residue from the tap water vessel weighed 0·049 gramme, and from the sample only 0·029. It is not to be inferred from this that the holder water is less corrosive

than the Leeds water. It seems likely that the sample supplied at first caused more rapid corrosion, but afterwards, on exhaustion of the cyanide in the holder water, corrosion was arrested, whereas in the tap water it continued.

Tests did show that the sample at the end was practically free from cyanides. The whole of the sample supplied had been used, and so further tests were impossible. In practice, of course, the reserve of cyanides in the holder water is large, and possibly being constantly replenished, so that the corrosion might go on unchecked.

The cyanides were present almost entirely as ammonium cyanide—traces only of ferrocyanide and sulphocyanide being detected. Ferrocyanide, when formed, would be precipitated as prussian blue, which would accumulate as a sludge in the holder tank. The absence of sulphide and sulphocyanide in quantity is noticeable.

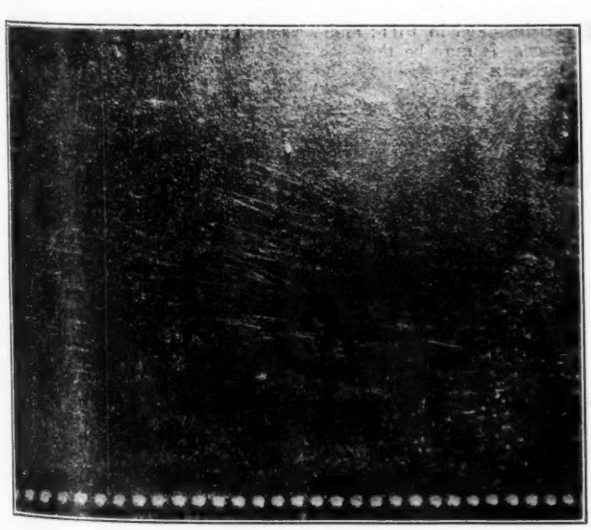
It was noticeable that the surface of the metal exposed to the holder water kept fairly clean, and no protective film was produced.

These tests cannot be regarded as complete in establishing the mechanism and progress of corrosion in the liquor. It is, however, clear that the liquor contains cyanides in an actively corrosive form, mainly ammonium cyanide, and that corrosion of the holder is likely to continue so long as the constituents of ammonium cyanide, ammonia, and hydrocyanic acid come forward.

On investigation, it was found that the cyanides were not going forward with the gas in quantity, but that spent oxide had been left adjacent to the holders; and undoubtedly the salts had been washed out of the oxide and into the tank water by rain. Clean water was immediately turned into the tanks; but the corrosion being initiated, it would progress electro-chemically whether cyanides were present or absent, and the time necessary to change all the water would be considerable.

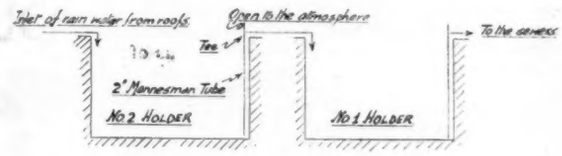
No. 1 Holder was first taken in hand; and every inch of paint was removed from the plates with blow lamps, scrapers, and wire brushes. We felt that if this were done, and the sheets then protected with two coats of the best paint procurable—the paint being given time to harden before immersion in the tank water—we should overcome the trouble. This was done. When the holder was put into action again, we found that, when the plates that had been in the tank water were again exposed, innumerable tiny points of blue had formed on all the plates. We had in stock a quantity of a heavy paraffin distillate; and we poured about 250 gallons of this oil on to the surface of the water in the tank. We then lowered all the affected plates through this oil film. On raising the holder again, we found that all traces of the blue points had disappeared. This was in the spring of 1923; and we have not touched the lower lift of this holder since that date. The higher lift we have painted, as it is not convenient to lower the entire holder through an oil film periodically.

We did not know quite what the action of the oil was; but it was so obviously successful that we decided to adopt the same method with our No. 2 Holder—three lifts. We felt that an oil with more body was needed, so that it would cling better to the metal than paraffin. Messrs. Alexander Duckham were approached; and they put forward an oil for the purpose. We did not wait to remove the old paint and rust scales from this holder, but passed it through the oil film as quickly as we could. Only the two lower lifts of this holder have been oiled, for the reason given in the case of No. 1—the top lift, not having been immersed in the holder water more than once or twice was in



quite good condition, comparatively. The oil quickly began to loosen the rust scales, and the action was assisted by us with scrapers. Again since 1923 the only protection the two lower lifts have had has been an oil film. As far as can be seen, corrosion has been stopped. Above is a photograph of one of the plates that was scraped to the metal; and the scraper marks are easily seen, revealing the bright metal at places. I think it is remarkable that these places should still remain bright after three years.

In order to prevent the oil going down the overflow when the tank was full, we fixed a length of 2 in. Mannesmann tube against the side of the tank, with a tee on the top. The branch of the tee was cemented into the overflow, so that all liquid leaving the tank had to rise up from the bottom of the tank through the steel tube. Further, in order to change the tank water automatically, the rain water from adjacent roofs is collected, and now runs into No. 2 Holder tank. The accompanying sketch shows the arrangement.



We introduced a layer of gas oil to the inside surface of the water in the tanks, in the hope that the good work on the external surface would be reproduced on the inside surface of the holder sheets. In endeavouring to arrive at the reason why the oil film had such a marked effect in stopping corrosion, I could only think that the oil must be acting as an insulator between the iron and the rust. In order to test this, the following experiments were made:

A piece of iron rod and a carbon filament from an electric lamp were placed in "Ferroxyl" and connected externally with copper wire through a micro-ammeter and a 10,000 ohms resistance. Immediately the rods were placed in the jelly the iron commenced to go into solution, as shown by the development of the blue colouration, and the micro-ammeter registered 30. Neglecting the resistance of the jelly, this reading is equal to a potential difference of 0·28 volt between the iron and the carbon. It was only necessary to immerse the iron ¼ in., or even less, in the jelly to obtain the same reading as that shown when the iron was almost entirely immersed in the "Ferroxyl."

The iron rod was then removed from the jelly, dipped in the oil used in our gasholder tanks, and replaced in the "Ferroxyl." No difference was shown on the micro-ammeter, which still read 30 micro-amps. The same result was obtained when the carbon was dipped in the oil and replaced in the jelly. The iron and carbon rods were now placed in a beaker of dilute sulphuric acid containing potassium ferricyanide, and connected as above, except that the resistance was left out. The iron was surrounded by a porous pot. No reading could be taken, as the needle of the meter jumped off the scale—*i.e.*, above 40 micro-amps—the blue colour appearing immediately. The porous pot was then removed, filled with gasholder oil, emptied, refilled with sulphuric acid, and replaced in the sulphuric acid solution; the iron rod being placed in it. No current at all passed through the circuit, showing that the oil had soaked into the pores of the pot and insulated the iron from the carbon. Of course, the iron went into solution locally. These experiments seek to show that the oil will effectively shield the iron from the action of an electrolyte acting in conjunction with a substance electro-negative to iron, if, and only if, the iron is completely covered with the oil; the non-protection of the iron when dipped in oil and then placed in the jelly being presumably due to the fact that the oil was rubbed off the surface of the iron at one or two spots as the iron was placed in the jelly.

In practice, it has been observed that the oil is an efficient deterrent of corrosion, even when the iron surface is already covered with a rust film. The experiment with the porous pot seems to suggest that the rust film acts as a porous pot, and as such is better than a bright metal surface for assuring a continuous film of oil over the whole surface—a necessary adjunct for effective protection, as shown by the "Ferroxyl" experiment.

Graphitization of Cast-Iron Mains.

This matter was brought to our notice more particularly in connection with water mains; the reason being, of course, that a water main is constantly under a condition of internal pressure, and will therefore more quickly reveal defects—especially from graphitization, the result being generally that a considerable hole is blown out of the side of the main. I am inclined to the opinion, however, that graphitization is more common than is generally supposed with gas mains. What is generally known as a porous pipe, which is supposed to have been converted into this condition by "natural corrosion," in my experience is usually due to that form of corrosion known as graphitization, on account of the fact that the skeleton of the cast-iron pipe can be easily cut with a knife, and has the appearance of graphite.

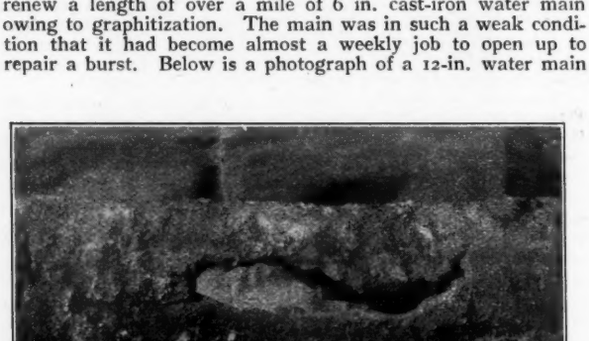
Unfortunately, I knew nothing about this question until 1923, when I heard a paper read by Mr. C. W. Webb on "The Corrosion of Yeovil Water Mains in Clay," before the Institution of Water Engineers. Mr. Webb showed that the corrosion of the pipes was due to the contact of the cast iron with wet clay—the corrosion being generally limited to a short distance from the sockets. This was owing to the fact that, where the

hand-holes had been made for jointing, the clay was not quite packed solid, and at these points water collected, and could not drain away through the clay. The water, moreover, that would collect at these points would be a saturated solution of the soluble salts in the clay. Among these was gypsum, which occurred disseminated through the clay more frequently as fine needle crystals; but occasionally large crystals were found with pearly lustre-selenite. No corrosion was found in pipes entirely surrounded by dry clay; but softening occurred in pipes in contact with wet or plastic clay.

It was also shown that concentration cell effects would bring about graphite corrosion. Such concentration cells would be formed by the salt impregnated soils in contact with the cast-iron water pipes. The impervious nature of the soil would prevent the ground water having a uniform concentration; and this difference in concentration over short lengths of pipe must give a concentration cell effect. Wherever crystals of gypsum are in contact with the pipe, there the solution must be saturated. At short distances removed from such point of contact, the soil solution would be less concentrated. Consequently, iron may pass out from the pipe into the dilute solution; and as it is almost immediately removed as insoluble hydrate, polarization would not occur.

The reduction of the ferric iron to ferrous iron was observed in experimental cells when the ferric oxide entered the cathode areas. This reduction would depolarize the cathode. If to this is combined the migration of colloidal ferric hydroxide from anode to cathode, it is readily seen how the whole process might continue indefinitely.

You will observe how closely the foregoing agrees with Prof. Cobb's work on the same subject. Fortunately, most of the mains in our area are laid in chalk, and chalk seems to have no effect whatever on cast iron. Here and there, however, we find strata of clay; and I think I can safely say that wherever we find a cast-iron main in this clay, softening to a greater or lesser degree has occurred. Last year we found it necessary to renew a length of over a mile of 6 in. cast-iron water main owing to graphitization. The main was in such a weak condition that it had become almost a weekly job to open up to repair a burst. Below is a photograph of a 12-in. water main



that caused us quite a little inconvenience by bursting in the middle of our High Street one afternoon. Here, again, when we got down to the pipe we found it embedded in clay; and portions of the pipe could easily be cut with a pocket knife. We hope that the rest of the main is either in chalk or in dry clay.

With regard to the remedy. In the case of the 6-in. pipe, the trench was excavated to an additional depth of 12 in.; and this 12 in. we filled in with chalk well rammed in. As the new pipes were already in stock, and we were carting chalk away from another job, this seemed the best way of dealing with the matter. In other cases we have adopted the same procedure. If, however, the cast-iron pipes were wrapped with jute and treated exactly like steel pipes, I feel that sufficient protection would be given

In another case gas and water mains were required for a housing scheme; and we found that they would all be entirely in clay. We adopted steel mains for gas, on account of the effective standard protection provided by the makers; and in the case of water mains we used a steel pipe recently put on the market by Messrs. Stewarts & Lloyds. Internally this pipe is provided with a layer of bitumen almost $\frac{1}{16}$ in. thick; and externally the pipe is wrapped and protected in the usual way to a thickness of $\frac{1}{16}$ in. to $\frac{1}{8}$ in. By this means the steel is entirely protected from corrosive influences, provided always that the lining and covering are not injured before being covered in.

A sample of the clay was sent to Prof. Cobb; and his report was as follows:

> As requested in your letter of July 17, the clay which had been in contact with a cast-iron main, and was suspected of being responsible for deteriorating action on the main, has been examined. The clay sample was first subjected to chemical analysis, with the following result:
>
> | | P.Ct. |
> |---|---|
> | Loss at 110° C. | 3·1 |
> | Loss on ignition | 5·0 |
> | SiO_2 | 64·15 |
> | Al_2O_3—TiO_2 | 8·6 |
> | Fe_2O_3 | 15·2 |
> | CaO | 0·45 |
> | MgO | Trace. |
> | Alkalis | Not done. |
>
> The only remarkable feature of this analysis was that the oxide of iron content was high; and it is to be borne in mind that oxide of iron in electrical contact with iron, such as is brought about by the presence of moisture, causes electro-chemical action with solution of the iron. The clay was then extracted with water, and the soluble matter so extracted was determined. It amounted to 0·41 p.ct. on the weight of the clay. Such soluble matter, by making the water more conducting for electricity, would facilitate any corrosive action set up.
>
> The next test, and probably the most important from your point of view, was to extract the clay again with water, and determine the hydrogen-ion concentration in the extract. This was found to be 3·2. The hydrogen-ion concentration for a neutral water is 7; and it falls away as acidity of the water, for any reason, increases. It is therefore plain that this clay is one which, when subjected to the action of water, yields a distinctly acid solution, such as would be expected to attack a cast-iron main.

I think the moral is that, before cast-iron mains are laid in clay, a sample of the clay should be submitted to a competent person for investigation, unless experience is to hand that the particular clay has no deleterious effects on cast iron.

INTERNAL CORROSION OF GAS MAINS AND SERVICES

In my experience, at any rate, gas entering distribution systems always contains a small percentage of oxygen and carbon dioxide, and will be saturated with water vapour at the temperature at which it leaves the holders. As the temperature of the mains underground is usually lower than that of the gas leaving the works, it follows that the gas will soon be supersaturated with water vapour in the mains; and as soon as the dew-point is reached, water will condense on the internal surface of the mains and services. We have, therefore, conditions entirely favourable to corrosion, unless the internal surface is protected in some manner. Would it not be worth while to put our gas into such a condition of moisture content that water will not condense out at the lowest temperature the gas will fall to? If this could be done economically, I am confident our internal corrosion troubles would be greatly reduced, if not entirely removed. Mechanically there is no difficulty about this, as either compression or refrigeration will bring down the excess moisture. I suggest that this is a question well worth investigation by some authority with technical staff and apparatus at its disposal.

If, in addition to the dehydration of the gas, we take advantage of Mr. Botley's work at Hastings, and arrange that our gas leaving the governors carries in suspension atomized oil, the mains and services will soon receive a protective oil film to guard against any remaining deleterious influences or exceptional circumstances.

It has been observed in Ramsgate that we have never had a single case of trouble with corrosion in any of our high-pressure services—usually $\frac{1}{2}$ in. steel tubing. The high-pressure system was installed in 1911; and we only compress to 60 in. head of water. It may be the case that much less compression is required than is theoretically necessary to remove excess moisture. Possibly the friction and centrifugal effect of the gas passing through the compressors has some bearing on this point.

There are, of course, many other aspects of corrosion in connection with our operations—for example, corrosion of boilers—to deal with which would need a text book; but if our modest experiences have been of any interest to you, my object has been achieved.

Discussion.

Mr. P. G. G. MOON (Bournemouth) said Mr. Ruthven had presented a highly informative paper, which would be of great assistance to all of them. Having said this, he would like to pay what he felt was a debt to the author. They would remember that last year, when he (Mr. Moon) read a paper on the new gas-works at Pitwines, Poole, of the Bournemouth Gas and Water Company, he told them, with satisfaction, that they had foreseen the difficulties which might arise from laying mains in ground largely reclaimed with clinker refuse, and that sufficient clay had been put aside to coat the mains efficiently, and so prevent corrosion. In the course of the discussion, which had been adjourned to the autumn meeting, Mr. Ruthven asked whether he had read the paper by Mr. C. W. Webb, on "The Corrosion of Yeovil Water Mains in Clay." At that time he had not done so; but he might tell them now that he took a very early opportunity after the meeting of looking it up.

EXPERIENCES AT POOLE.

What he read in Mr. Webb's paper filled him with misgiving, which proved amply justified when he made an examination of the very young mains that had been laid throughout those new works. It was this warning by Mr. Ruthven which had led him to make so early an investigation; and for this he wished to thank him. There

were some 15,000 ft. of steel and cast-iron mains, from 24 in. downwards; and on the side nearest the sea, they found the corrosion had already been very considerable. In fact, some of the cast-iron mains were so seriously graphited that one could cut pieces away with a knife. He had hoped, when he read the paper by Mr. Webb, which showed that the trouble occurred mainly at the joint holes, that he himself would be all right, seeing that his mains had been very carefully wrapped with clay; but unfortunately there was corrosion throughout. He thought perhaps it was not chemical action, but electrolysis; and he found there was, in fact, a very considerable electric current passing from the ground into the mains. He then wondered if this was due to leakage from their works system; and in order to ascertain whether or not it was, he had the electrical plant shut-down, but the indications of electric current were still there. Thus it seemed to be clearly a case of electrolysis; but whether it was wholly electrical or partly chemical, arising from made soil which contained a lot of waste material that readily oxidized, could not easily be determined. Farther away from the sea front, where the mains were laid in a much older soil, he could get no electrical results, and the mains were not corroded. This went to show that the trouble was due to electric currents, rather than to the reaction of the wet clay on the outside of the pipes. He could not refrain from telling the members about the bad points of his new works, as they had shown so much appreciation of what they had considered to be the good points.

SILICA-GEL.

With regard to the author's suggestion that for the prevention of internal corrosion of mains it was desirable to reduce the moisture content of the gas, he would like to ask whether, in this connection, Mr. Ruthven had considered a relatively new material, silica-gel, which removed 40 p.ct. of its weight of moisture, and which was employed very effectively for drying air used in blast furnaces. He himself was looking into this proposition, not only from the point of the prevention of internal corrosion, but also from the aspect of the difference in the naphthalene saturation points of wet and dry gas. Wet gas which was saturated when 4 grains of naphthalene were present, when dry would not be saturated until it contained 9 grains.

The PRESIDENT (Mr. R. Robertson, of Bristol) remarked that Mr. Shapley had not very long ago devoted an interesting Presidential Address at Manchester to this subject; and they would be very pleased to have a few words from him.

BITUMEN SOLUTION.

Mr. C. S. SHAPLEY (Leeds) said the paper contained much which the time at disposal would not permit one to go deeply into. While the author had certainly found out a lot about corrosion, he himself (and he had had plenty of it) preferred to put it down to a little inattention at painting time—the work not having been thoroughly done, and perhaps not with the correct materials. The author did mention in his paper two coats of the best paint procurable. He (Mr. Shapley) had given up the use of paint as paint, and had gone in for a bitumen solution. After tackling this question for nine years in connection with the holders, he thought he could say that he had now about broken the back of the corrosion. One case of corrosion of a large gasholder was due mainly to an ammonia works on one side of it. He would like to set Mr. Ruthven's mind at rest on one point—where he referred to holders being replaced out of capital account. He himself felt he had reason for hoping that this would not be necessary. Recently he had been in five of his holders which had not been opened for thirty years, and in one case the bloom was still on the iron. Of course, he endeavoured to make a straight gas; and his oxygen was 1·2 p.ct. The paper should be recommended for study to the members of their staffs whom they expected to take some interest in the subject of corrosion.

ACTION OF BOILED OIL.

The PRESIDENT asked Mr. Ruthven what he considered to be the proper procedure in connection with the application of the first coat of paint. It was undoubtedly the fact that a very great deal depended upon the selection of the right paint and the application of it in a proper way. Again, how did he regard a primary coat of boiled oil, which was favoured by many? One disadvantage, he (the President) thought, was that it was liable to become broken in surface in handling, and this damage was very difficult to detect. He was, indeed, told that the presence of the oil really served to promote corrosion. Reference had been made by the author to the subject of defective design. Of course, they all knew that very badly designed holders were constructed many years ago; but most good firms had now, he thought, departed from these bad designs. He knew, however, of a number of gasholders with steel framing, erected within the last few years, which still had many of the undesirable features to which attention had been drawn—inaccessibility of various parts to the paint brush, &c. To his mind, this formed a good case for a clearing house of information. It was a matter which the Society of British Gas Industries might take up, with a view to eliminating all the unsound points which arose in the design of their structures.

THE QUESTION OF SERVICE PIPES.

As to the corrosion of service pipes, the Institution of Gas Engineers had done an extraordinarily valuable piece of work in promoting research into these elusive problems; and they were all looking forward with great interest to hearing that an agreed specification with the manufacturers of steel pipes had been evolved, because at present the difficulty was to tell one brand from another. The terms "steel," "mild steel," and "wrought iron" conveyed no meaning as to what the construction of the services actually was; and a reliable specification would be very valuable. They had in Bristol been conducting experiments on this particular point. Up to a couple of years ago, they were one of those undertakings who barred steel or wrought-iron service pipes altogether; the whole of their services being in lead. The fact that the effects of the very corrosive subsoil in their neighbourhood had been overcome by adequate wrapping had, however, led to a revision of that arrangement; and they were new putting in mild-steel or wrought-iron pipes. As to the internal dressing of service pipes, he thought it was equally necessary that they should have some further information regarding adequate protection of the outer surface, because these experiments of theirs had brought to light one or two extraordinary results.

"ARMCO."

In the main, the experiments followed the lines of the Institution Committee and other workers, so far as the intensive tests of the laboratory were concerned; but in Bristol they found there was a difference in the results when the tests were made under working conditions—that was, if the bare pipe was buried in an artificially prepared soil. Then they found that the relative rate at which the pipes were attacked was not nearly so much in favour of the wrought iron. "Armco" was one of the brands they tested; and this showed up worse than anything. It was much more rapidly attacked even than mild steel. But although the loss of weight in the "Armco" pipe was greater, it appeared to be distributed all over the surface; whereas with mild steel it was localized. The tests pointed to the necessity for having some proper insulating covering of wrought-iron or mild-steel, or "Armco" pipes, to render them immune. The evolving of a specification for a covering material that would be safe in use was, therefore, another matter which might occupy the attention of the Committee. As to Mr. Moon's point about silica-gel, from what he had heard on the subject he (the President) was afraid it was open to the objection that, while it certainly eliminated the moisture, it was liable to absorb a lot of valuable hydrocarbons as well, and on this account should only be used with considerable care.

REPLY BY THE AUTHOR.

Mr. RUTHVEN replied in detail to the points that had been raised in the discussion; and in the course of his remarks he said that the more one looked into this matter, the more puzzled one became. He knew nothing about silica-gel for drying gas; but it seemed to him that compression, as referred to in his paper, was a simple operation. They had only compressed their gas to 60 in. head of water, and had been supplying it in this way from 1911; and they had never had a single case of corrosion in any of their high-pressure services, which were usually ½-in. steel tubing. With regard to the "two coats of best paint," he purposely left this vague. He did not in the least wish to suggest that he knew anything in particular about paint. There was, however, a remarkably good paper on this subject written by Dr. Friend, of Birmingham, which would well repay anyone for reading. In it the author dealt with paints scientifically, and arrived at useful conclusions. So far as he himself was concerned, what he had done was to go to a firm of repute, and ask them for the best paint they could supply—placing the circumstances before them, and being guided by their judgment. He was rather inclined to think that boiled oil was a much better preservative than the ordinary red oxide paint put on when plant left the makers' works. Really fine white lead, as made in the old days, was as good a preservative as one could wish for. With regard to ascertaining whether one was using mild steel or wrought iron, he might remark that an etching test had been devised. The test was fully described in the Report of the Wrought-Iron Tubing Committee, in 1925. Wherever he had a dangerous sub-soil, he used wrought-iron tube, jute wrapped; the screwed part being wrapped with jute and tarred before being filled in. Tests that had been carried out on "Armco" pipe did not appear altogether to agree with what the President had said. They seemed to show that where the metal was damaged by screwing its resistance was reduced, and it would quickly corrode; but in the body of the pipe very good resistance indeed was found.

FURTHER INSTALLATIONS OF WOODALL-DUCKHAM VERTICALS.

Extensions at Bolton and Wolverhampton.

The County Borough of Bolton Gas Department have placed an order with the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., for a further installation of Woodall-Duckham continuous vertical retorts at their Gas Street Works. The new bench, which will comprise 24 retorts, will have a total carbonizing capacity of 198 tons per day. It is to be placed parallel to the existing bench. The contract includes coal handling machinery, a rotary wagon tipper for discharging wagons, and a waste-heat boiler. This will be the third installation of Woodall-Duckham vertical retorts at Bolton, making the total carbonizing capacity of these retorts 546 tons per day.

The Wolverhampton Gas Company have also placed an order with the Woodall-Duckham Company for a third installation of their continuous vertical retorts. This consists of an extension to the No. 2 installation, and will comprise four settings, each of four retorts and one producer. The new plant will have a nominal daily carbonizing capacity of 112 tons. The contract includes coal and coke handling plant, and a waste-heat boiler. With this extension, the total carbonizing capacity of Woodall-Duckham vertical retorts at Wolverhampton will amount to 304 tons per day.

THE IMPORTANCE OF THE LIGHTING LOAD.

An Object Lesson.

One of the various ways in which something may be done to impress the public with the importance of the lighting branch of the gas industry is by inviting organized parties to visit the works of up-to-date manufacturers of the things which are required for indoor and outdoor illumination by that means. Thus it was that one felt, on Thursday afternoon, Nov. 18, that valuable propaganda work was being performed by Messrs. William Sugg & Co., Ltd., when they showed a number of members of the Institution of Engineers-in-Charge over their extensive works at Westminster. The visitors assembled at the Ranelagh Works, in Chapter Street, where they received a cordial welcome from Mr. Philip Sugg (the Chairman of the Company), Mr. Anthony Sugg (who is Secretary), and the other Directors —Messrs. J. W. Lofts and W. Mattock; and then began a tour which was obviously a revelation to some of them.

IN THE WORKS.

Being mid-week, everything was in full swing; and any number of interesting operations could be followed through from beginning to end. There was an inspection of the foundry, where brass, gun-metal, iron, and aluminium are cast into various forms for all kinds of lighting components; and the machine shops, where these castings are turned and partially fitted. Then in the automatic shops all kinds of small components are turned wholly or partially by automatic machinery, in the brass finishers' shops other small components are made, and in the stamping shops sheet-metal lamp components are stamped or pressed to shape, and sometimes joined together by acetylene welding. As much time as could be spared was devoted to the spinners' shops, in which spinnings of all kinds for lamp casings, reflectors, &c., are made in iron, copper, brass, and aluminium. In addition to the metal polishing shop, the assembly shops, and the tinsmiths' shops, there are testing rooms in which every lamp and burner is adjusted and thoroughly tested before leaving the factory. A department of more than usual interest is to be found in the steatite shops, which are employed in the turning of steatite for use in gas burners and also as insulators for electrical work. There are separate stove shops, in which the manufacture of gas cookers is carried on.

Everywhere activity; in all the departments lamps and burners in process of making in such numbers as completely to disillusion any visitor who might have been nursing some vague notion that the lighting load of the gas industry was either dead or dying. How many of the thirty-five visitors entered the works under such an impression, it is, of course, impossible to say; but the Vice-Chairman of the Institution (Mr. W. Edwards) himself admitted that what they had seen had surprised some of them. It is to be hoped that subsequently, passing through Westminster on their way home, these members took note of the evidence that is there to be found of the capabilities of gas for public lighting.

On assembling for tea, attention was for a few minutes turned from the question of gas lighting to that of gas heating; for, in addition to their big business in the lighting branch, and their manufacture of the well-known "Chef" and other types of gas cooker, Messrs. Sugg & Co. are again turning their attention to gas fires, which were included in their work in former times. They are now concentrating on a new style of fire, which possesses a number of features that were indicated to the visitors. It is a fire with the fuel line incurved, so that it fits right into the grate opening; and the three sizes in which it is being made (with the aid, where necessary, of attachable side pieces of varying widths) will enable it to meet any requirements. The appearance of the fire is pleasing; and there is nothing complicated about its parts.

PAST AND PRESENT.

A vote of thanks to Messrs. Sugg & Co., and to the Directors who had devoted the afternoon to looking after the welfare of their guests, was proposed by Mr. Edwards, who said the members of the Institution had much enjoyed seeing the works, and deeply appreciated the hospitality that had been extended to them. What the visit had revealed to Mr. Edwards was that, "so far from being a dying industry, gas seems to be a very healthy competitor of electricity," and he added: "This is a good British house doing what it can for the nation." The Hon. Secretary (Mr. A. E. Penn), seconding, pointed out that the works bore the impress of the "good old days," when the relationship of the employer to his employees was more like that of a father to his children. Unfortunately, in the "progress" which was supposed to have been made, that friendly intercourse between master and man had to a large extent died out, though evidence of it was still to be found in the works of Messrs. Sugg & Co. One must deplore industrial conditions which tended to remove workers farther and farther from the masters, because the atmosphere thus created led to the disturbed state of affairs which was now being experienced. He bore testimony to the excellence of the machinery provided in the works.

The visitors were assured by Mr. Philip Sugg of the great pleasure that it had given him and his co-Directors to show them round the works, and to explain to them something of the many processes which went to the making of a gas lamp. The factory had been in course of extension for a great number of years, which accounted for the fact that it was perhaps—in some respects, though not all—not quite what one would imagine that a modern factory would be. In a way, the firm gloried in this, because it was an indication of the age of the business. It was originally started as a private business, for the manufacture of gas meters, somewhere about 1837, in Marsham Street. That was in the time of his grandfather. It was the son of that Mr. Sugg (and his, the speaker's, father) who had been so well known in connection with gas lighting. A move was made into Vincent Street about 1864, and, as was the custom in those days, Mr. William Sugg lived on the works. He was a most energetic man, and gave the business a reputation which, fully maintained, had remained a tower of strength to it right down to the present day. In some respects the works which they had seen that day were unique—for one thing, because there were so many processes carried on under one roof. It was seldom that one came across a works so thoroughly self-contained. There was everything there that was required for the production of gas lamps for public and domestic lighting. As a matter of fact, during the war that was one of the first firms to be controlled—probably for the reason that it was so self-contained, which, in all likelihood, was also why they were among the last to be de-controlled. It was not until March, 1919, that the whole concern was handed back to them—less their own business, but fortunately with the same old goodwill which had always been their greatest asset. The self-contained nature of the works, of course, had a highly important aspect from the point of view of the customer, inasmuch as it enabled the firm personally to guarantee the goods they sent out, instead of having to rely in some respects on the guarantees of other people—which was quite a different matter. Though, as he had said, the premises indicated the age of the business, their equipment was so absolutely up-to-date that no one need have any fear in entrusting a job to the firm.

Prior to the breaking up of the gathering, Mr. J. W. Lofts (who is Director of Gas Sales) expressed the hope that the visitors would leave fully impressed with the ability, as well as the willingness, of the firm to meet their requirements.

RAISING CALORIFIC VALUES BY DISSOCIATION OF TAR VAPOURS.

An abstract of a paper read by Prof. H. Strache at this year's meeting of the Bavarian and Austrian Gas Association appeared in a recent number of "Das Gas- und Wasserfach" (July 31).

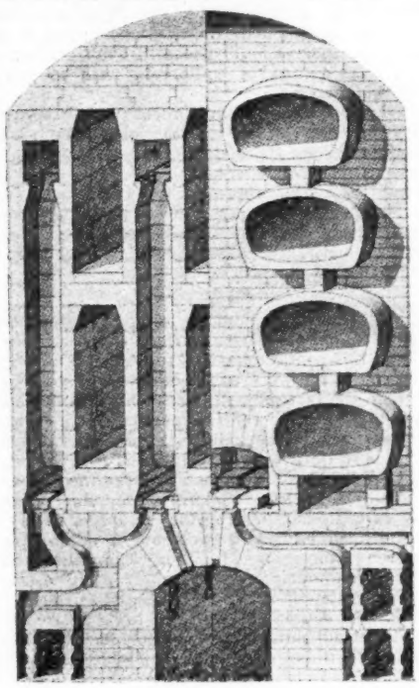
In earlier attempts at the production of "double" gas on a practical scale, it had been shown that, with superheater temperatures of 750° to 1100° C., the passage of the tar with the gas through the superheater did not effect a raising, but rather a reduction, of the calorific value of the gas. This was due to the reaction of the tar with water vapour to form carbon dioxide and hydrogen. The maximum hydrocarbon formation from tar takes place somewhere about 700° to 750° C.—that is to say, with only a comparatively moderate degree of superheating. As the maintenance of the correct temperature gives rise to certain difficulties in practice, the author has evolved a new process, whereby the tar vapours are perforce dissociated at the temperature which gives the best results. The principle is that the tar is separated out of the gas at a temperature which is above the dew point. It is thus practically free of moisture, and in this condition is returned to the carbonization column of the double-gas producer. The tar thus proceeds, with the coal, into increasingly hot zones, where the distillation of the most volatile constituents takes place, and at the same time a partial dissociation of the tar oils begins, so that a small quantity of high-calorific gas is formed out of the tar. The remaining liquid tar-oil products are always returned into the carbonizing chamber, so that each time a small quantity, of high calorific value, is dissociated; the final solid residue being used, with coke, for water gas production.

The degree to which improvement in the calorific value of the gas can be effected in this way naturally depends upon the class of coal in use. With a normal Silesian gas coal, an increase from 3200 calories per cub.m. [400 B.Th.U. per c.ft.] to 3600 calories is obtainable. No tar is, of course, recovered; and this loss must be set-off against the gain in calorific value. If desired, other tar—for instance, producer tar—can be introduced to improve the gas quality.

CONVERTING RETORT SETTINGS INTO CHAMBER OVENS.

[From the "Journal des Usines à Gaz."]

Many Continental gas-works of a daily output of 10,000 to 50,000 cub.m. [0·35 to 1·75 million c.ft.] make their gas in horizontal settings of 6-m. [about 20 ft.] through retorts, or else in stop-ended 3-m. retorts in back-to-back settings. Each setting normally has a producer and a recuperator; and the retort house is provided with the necessary coal and coke handling plants. Nowadays, mains are being extended, the standard of living is improving, labour is expensive, and hours are short, and as a result most works are faced with the necessity for increasing their output; and in many cases it might appear necessary, at first blush, to scrap a comparatively new installation, so as to make room for the increased output.



M. Lefebvre, Consulting Engineer, in a recent issue of the Bulletin of the Belgian Gas Association, puts forward a suggestion for preserving a works' original equipment, with the exception that small horizontal chambers are substituted for ordinary retorts in the horizontal settings; the only portion to be interfered with being that which has in the ordinary course of events to be removed from time to time. The accompanying illustration shows the conversion of an eight-retort setting to a six-chamber setting.

The following figures of throughput demonstrate the advantages to be gained by conversion:

—	8 Retorts.	6 Chambers.
Unit charge	600 kg.	1,475 kg.
Total charge	4,800 ,,	8,850 ,,
Throughput (24 hours)	14,400 ,,	17,700 ,,
Carbonizing period	8 hours	12 hours

(1 ton = 1016 kilos.)

Thus the output may be increased by about 20 p.ct.

In the event of the original installation having only a single hydraulic main, it is well to add a second when converting the setting, for the rush of gas produced at the moment of charging must be allowed to get away fairly easily—if it remains too long in the upper part of a chamber, it is liable to undergo decomposition by cracking. Alternatively, an extra thickness of refractory material will obviate this disadvantage.

As regards the dimensions of the chambers, these of course depend upon the arches, &c.; but the author has met the following sizes in practice: 6 m. by 1 m. by 0·327 m.; 6 by 0·94 by 0·330; and 6 by 1·065 by 0·312.

In order to attain regular carbonizing temperatures, special attention should be paid to the heating arrangements. One method is to dispose the burners to right and to left of the centre chambers; the gases passing up between the chambers and down between the latter and the outside walls. Another arrangement suggested is to dispose a series of burners in every interval between side wall and chamber and intermediately; the burners being alternately at the front and the rear of the setting. Silica or siliceous materials should be used for the chambers.

In addition to the increased output attainable by means of these small horizontal ovens, the author remarks that considerable advantages are to be gained in the matter of residuals. The coke is of excellent appearance—"semi-metallurgic" in nature. It is, moreover, a satisfactory domestic fuel, and the proportion of waste and dust is not great. As for ammonia, the make of sulphate has been increased by as much as 1·5 kg. per metric ton; and as regards the tar, results up to date point to the fact that it has not undergone cracking as in the case of retort settings, and that consequently it is richer in light hydrocarbons and contains less fixed carbon. Unfortunately, no actual figures are yet available; but they are awaited with interest.

FUELS FROM CARBONIZATION PROCESSES.

A paper on "Oil Fuel and Other Fuels from Carbonization Processes" was read by Dr. F. MOLLWO PERKIN, C.B.E., at a meeting of the Institution of Petroleum Technologists at the Royal Society of Arts, on Tuesday, Nov. 9.

After admitting that the subject is one bristling with difficulties, the author went on to say that the point which those connected with low-temperature carbonization seem to overlook is that the object of the gas industry is to produce gas, and that the larger the quantity they can make from a ton of coal the more satisfactory the process. Coke, tar, and sulphate of ammonia are bye-products. If they can obtain a good price for these bye-products, then they are able to sell their gas cheaper, and, owing to larger distribution, make greater profits. Persons interested in low-temperature carbonization can learn much from the plodding work of those engaged in the gas enterprises, whose great undertakings were built up step by step.

GAS-WORKS PRACTICE *v.* LOW-TEMPERATURE CARBONIZATION.

In carbonizing coal for the production of smokeless fuel and oil, a good coal must be employed, if the process is to be an economic success. If the fuel is very high in ash, then naturally the heating value is lower than when there is very little ash present; and it does not ignite so readily—consequently its value is lower. Furthermore, if it is high in ash and deficient in volatile matter, the oil yield is low and also the yield of gas. This is of considerable importance, because the gas is required for heating the retorts.

There has recently been written in the Press a great deal about the yields of gas by low-temperature carbonization and either the enriching of, or adding to, the volume of gas obtained from gas-works. Enrich, certainly, if you can spare the gas; but the retorts must either be heated by solid fuel or by the gas produced in the carbonizing process. The important economic question arises: "Which is the cheaper?" We know that in a gas-works about one-third of the coke produced is required to heat the retorts. This brings out again the radical difference between gas-works procedure and that of low-temperature carbonization. The first aims at gas; everything else is a bye-product. With low-temperature carbonization, smokeless fuel is the main product; everything else is a bye-product. It follows, therefore, that the smokeless fuel must not be used for heating the retorts. If sufficient gas is not obtained from the low-temperature retorts, an outside producer must be employed to give the extra gas necessary. As a matter of fact, the yield of gas on the low-temperature plant is from 5300 to 6000 c.ft., and there is only a small residue (if any) after the retorts have been operated.

TYPES OF PLANT.

Dr. Perkin then classified the processes which have been utilized for low-temperature carbonization—namely, vertical retorts with no mechanical internal machinery, horizontal retorts with mechanical screws or conveyors, and rotary retorts. While agreeing it can hardly be claimed that so far low-temperature carbonization has been a commercial success, he sees no reason to doubt that soon a very large amount of coal will be carbonized for the production of smokeless fuel and bye-products, and his own opinion is that the retort of the future will be vertical, heated externally and also internally by passing a portion of the thoroughly-scrubbed gas up through the retort. In conclusion, he quoted some figures obtained on large-scale tests (with values based upon more or less hypothetical prices), to show the possibilities of low-temperature carbonization.

APPLIANCE TESTING LABORATORY.

The Work of the American Gas Association.

It was stated by the Chairman of the Laboratory Managing Committee (Mr. R. W. Gallagher, of Cleveland, Ohio), in a report submitted at last month's annual convention, that the past year marks an important milestone in the history of the American Gas Association's testing laboratory. In 1925 the establishment of this new branch of work was recorded; while on the present occasion it was possible to point to results accomplished. What is rightly regarded as one of the most significant facts in connection with the work is the recognition of its value by many members of the gas consuming public. Most gas company and appliance manufacturer members of the Association, too, have come to regard the work of the laboratory as having an essential part in their business, and as representing an impartial testing agency on which they may all rely.

APPLIANCE COMMITTEES.

The Association's Appliance Committees have made great progress in their work; and it is anticipated that by Jan. 1 next routine testing on all major types of domestic gas appliances will be progressing satisfactorily. The work of these Appliance Committees will not only fill a long-felt need in so far as the gas industry is concerned, but there is also a possibility of their standards being adopted by municipalities as the basis for applying gas ordinances, such as has been done in the City of Baltimore. Plans are now under way to secure approval of all the "American Gas Association Requirements" by the American Engineering Standards Committee, and portions of them by the American Society of Mechanical Engineers. The Canadian Gas Association have also under consideration the adoption of the American Gas Association's appliance standards; and it is regarded as possible that these "Requirements" will not only have national recognition, but will eventually be adopted throughout the entire North American continent.

GAS ORDINANCES.

The City of Baltimore has been enforcing very satisfactorily for over a year a Gas Ordinance requiring that all appliances sold or offered for sale in that city must meet the Approval Requirements of the American Gas Association. Los Angeles is also considering the adoption of a similar Ordinance; and the City of New York has enacted an Ordinance requiring that all gas tubing marketed in that city must successfully withstand an examination based on standards similar to those of the American Gas Association.

The action taken by these three large cities will establish a very strong precedent for other municipalities to follow, when considering similar matters.

TESTING WORK.

Co-operation of the United States Bureau of Standards materially assisted the Association in their appliance research work during the past year. One of the testing laboratory engineers is employed permanently at the Bureau, and is engaged continuously on problems relating to the utilization of gas. So far the work of the Bureau has largely had reference to matters of safety—particularly those factors relating to the combustion of gas. The problems are recognized nationally as being the most important now facing the gas industry in the utilization of its product. As soon as the research on combustion has been completed, other important questions will be taken up.

According to the present records of the Association, there are ten manufacturers of flexible tubing, and 520 makers of stoves, fires, and other heating appliances, and water heaters. Of the ten tube manufacturers, eight have submitted samples, and now have one or more types on the Association's approved list. About 70 p.ct. of Association member range manufacturers have, during the first year of the laboratory's work, taken advantage of its services; while some 6 p.ct. of the non-member manufacturers submitted samples for examination. As a matter of fact, the actual situation is much better than is indicated by these figures, as a large number of the manufacturers are making changes in their appliances, and as early as possible will submit their reconstructed models to the laboratory for test. In connection with "space heaters" (which are usually employed for heating occupied rooms where there is a possibility of the customer breathing the products of combustion), the safety requirements have been made much more severe than for other common types of domestic appliances; and it is felt that the testing laboratory should prove of even greater assistance to makers of this class of equipment than to gas range or tubing manufacturers.

The Oct. 1 list of approved appliances (which represents about a year's testing work) shows that the laboratory has tested and approved 14 different types of flexible gas tubing, 1373 gas ranges, and 14 "space heaters."

All manufacturers of approved types of appliances are required to stamp their equipment with the laboratory's official marking seal; and makers of such appliances who are now using this approval seal are stated to be finding in it unlimited advertising and sales possibilities.

PUBLICITY.

The subject of national publicity for the gas business is being considered by a Special Committee of the American Gas Association. In this connection, it is felt that the widest publicity should be given to the work of the laboratory, so as to acquaint the public with the fact that, in purchasing gas appliances, they should first look for the official marking seal. These efforts should not only benefit the manufacturer of better types of appliances, but also go a long way towards relieving the present maintenance and service responsibilities of the gas companies. Further than this, the use of approved appliances should mean better satisfied customers, and in the end larger sales of gas.

One of the most important problems of administration that confronted the Laboratory Managing Committee during the year was that of financing. While the routine testing work is designed to operate on a self-supporting basis, the funds required to add new equipment, &c., had to be secured from other sources. The establishment of the laboratory was made possible by the contributions of company members and other members of the Association; and the Gas Appliance Manufacturers' Association, with members of the American Gas Association, have been giving attention to financing the laboratory programme—the Appliance Manufacturers' Association suggesting a contribution of $15,000 each year by member manufacturers, contingent on the contribution of $35,000 by the gas company members of the American Gas Association.

While the testing laboratory does not instruct the manufacturer how to design or build his appliances, it does give him complete information, following each approval test, on the defects of his product. With this information in mind, the manufacturer can proceed intelligently to make such corrections on his equipment as are necessary. Even at this early stage marked improvement can, it is said, be noted in the construction of different types of approved gas tubing and ranges now offered to the public.

COAL ANALYSIS.

A Distillation Method for Gas-Works and Coke-Ovens.

[From an Article by L. Litinsky in "Die Messtechnik," Nov. 10, 1926.]

The author was induced to describe the process in detail by his discovery that it is not generally known in gas-works laboratories, although it has been widely used and thoroughly proved in the coke works of the Ruhr district. He himself has had considerable practical experience with it, and the opportunity of comparing, to his satisfaction, the results obtained with those given by the same coals in actual practice. The principle, he says, originated with Dr. Bauer, but improvements and modifications have been introduced from time to time.

A tube of difficultly fusible Jena glass, sealed at one end, 530 mm. [20·83 in.] long and 14 mm. [0·55 in.] internal diameter, is first carefully washed out with water, and then with spirit and ether, and finally dried. Then 20 grammes of dried powdered coal are introduced, followed by two plugs of asbestos wool, which take with them any grains of coal which may have remained adhering to the sides of the tube. The plugs are so placed as to allow of a free space above the coal (see fig. 1). A long iron spike of about 5 mm. diameter is then used to bore holes through both plugs in two or three places, to allow of the gases' passing through during the experiment. Next there is introduced a column of finely divided, well dried fireclay, about 140 mm. [5·5 in.] in length, which, when heated-up in the course of the tests, performs the functions of the hot retort wall. This is likewise kept in position by an asbestos plug, which is bored in the same way as before. The tube, thus filled, is weighed, and introduced into an ordinary furnace. In order to prevent the fusing of the tube in contact with the fireclay of the furnace, it is best laid on a strip of asbestos paper, and a layer should also be placed on top of the tube, so that the latter is, so to speak, enclosed in asbestos paper. The rest of the procedure can be seen in fig. 2.

The tube 2 is connected by means of a bored cork to a tar tube 7. The latter is filled with cotton wool, and is weighed, with the wool, before the experiment. Next to this comes a

Fig. 1.—DISTILLATION TUBE FILLED FOR THE TEST.

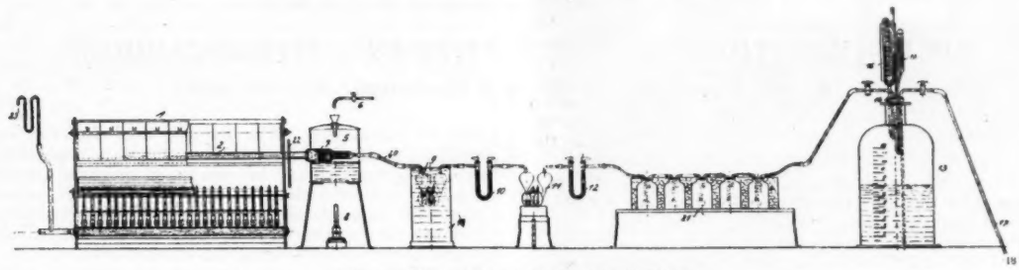


Fig. 2.—THE APPARATUS ASSEMBLED.

smaller tube 20, for naphthalene, with short rubber-tube connections, and this is followed by the absorption vessel 9, which is filled with N/10 sulphuric acid tinted with methyl orange, and serves to take up the ammonia. The vessel 11 is filled with caustic potash 1 : 3 for the absorption of sulphuretted hydrogen and carbon dioxide. Each absorption vessel is followed by a U-tube of calcium chloride (10 and 12). Parts 11 and 12, as well as 9 and 10, are weighed filled before the experiment. Next come five specially constructed small flasks 21 filled with paraffin-oil, weighed separately, and connected together in an ice box by very tightly fitting, short lengths of rubber tubing. The gas collecting flask 13 is fitted with a rubber stopper 14, which is bored in four places for the introduction of a manometer 15; thermometer 16, and two glass cocks—the gas inlet, and the water overflow 17. All else is clear from the diagram, the remaining numbers denoting 1 the furnace, 5 a water bath, 6 a continuous water supply, 8 a burner, 18 a water tank (not shown), 22 an asbestos mat, and 23 a gauge to show the pressure of the gas service.

When all is connected up, the apparatus is tested for tightness by setting up a vacuum. Then the cock leading to 17 is closed, the burner 8 under the water bath 5 is lighted, and a constant level maintained in the latter by suitable regulation of the water supply from 6. Then the first right-hand burner of the furnace is lighted. The gas cock 14 is only opened when the heat has established a pressure in the apparatus, so that the gas can collect in 13, displacing water through the tube 17, which is also initially full of water. Then gradually, at intervals of 6 to 8 minutes, the remaining burners beneath the fireclay are lighted. When this is all red-hot, the burners under the coal are lighted, one at a time from right to left, at intervals of about 10 to 15 minutes, according to the rate of gas development. This—or, more accurately, a few minutes earlier—is the beginning of the actual distillation test, which occupies two to three hours. It should be carried through as evenly as possible, and this can be judged from the regularity with which the gas bubbles through the apparatus. The cessation of gas development of course indicates the end of the test.

When this is reached, the temperature of the gas is noted at 13, the degree of vacuum at 15, and a barometer reading is taken. The burners are then extinguished, all cocks in the apparatus closed, and the tube is allowed to cool. When cool, all necessary parts are weighed, as well as the water which has been displaced from 13. For this purpose, such quantity is allowed to be drawn in from the container 18 as will counteract the vacuum. The water in 18 then corresponds to the quantity of gas in 13 at the noted temperature and pressure. It is important, if using a gas furnace, that the test should be carried out under constant conditions, and attention in this respect should be given to the pressure and calorific value of the gas supply.

For working out the results, special formulæ can be prepared which simplify the calculations considerably. The following example illustrates how this is best done:

1. *Coke Make.*

Initial weight of tube, including coal, fireclay, and asbestos	193·0400 grammes
Weight of tube at end of test.	188·4700 ,,
First difference	4·5700 grammes

With a file or glass cutter, that part of the tube in which there are tar deposits is now cut off—*i.e.*, the portion between the asbestos shield 22 and the tar tube 7.

Weight of this portion, together with tar deposits	24·8548 grammes
Weight of same, after removal of tar (see ammonia section later) and subsequent heating of the glass to redness	24·6390 ,,
Second difference . . . (C)	0·2158 gramme

The loss in weight due to distillation is, therefore, 4·5700 + 0·2158 = 4·7858 grammes, or 4·7858 × 100 ÷ 20 = 23·93 p.c., which makes a coke output of 100 − 23·93 = 76·07 p.c.

2. *Tar.*

Weight of tar tube 7 after the test, together with tar absorbed by cotton wool. . .	49·3178 grammes	
Initial weight of tube and cotton wool . .	48·6754 ,,	
	(A)	0·6424 gramme
Weight of naphthalene tube 20 after test	5·0620 grammes	
Initial weight	5·0608 ,,	
	(B)	0·0012 gramme

The weight of tar in part of the coal tube (C) was 0·2158 gramme, so that the total tar output is

A + B + C = 0·8594 gramme or 4·3 p.c.

3. *Liquor.*

Final weight of absorption vessel 9 together with $CaCl_2$ tube 10	88·8554 grammes	
Initial weight	87·7626 ,,	
		1·0928 grammes

or 5·46 p.c.

4. *Ammonia, reckoned as Sulphate.*

After weighing, the contents of the vessel 9, the naphthalene tube 20, the tar separator 7, and (before heating it) the piece broken-off from the coal tube, are carefully washed out with distilled water into a flask, and the liquor is distilled with strong KOH solution; the NH_3 being absorbed by the N/10 sulphuric acid.

N/10 H_2SO_4 total	45·0 c.c.
By titration	6·5 ,,
Required	38·5 ,,

from which

$$38{\cdot}5 \times 0{\cdot}0017 \times \frac{100^*}{25} \times \frac{100}{20}$$

* $(NH_4)_2SO_4$ is four times as heavy as NH_3

or more simply

$38{\cdot}5 \times 0{\cdot}034 = 1{\cdot}31$ p.ct. $(NH_4)_2SO_4$.

If desired, the combined and volatile ammonia can be determined separately.

5. *Benzole.*

The absorption flasks 21 are weighed, thoroughly dry, before the test, and again afterwards, giving a difference of (say) 0·1260 gramme, which represents 0·63 p.ct. of crude benzole.

6. *H_2S + CO_2 + CN.*

The difference in weight, between the beginning and end of the test, of the absorption vessel 11 with its $CaCl_2$ tube 12 is 0·1822 gramme, or 0·91 p.ct., representing H_2S + CO_2 + CN. The contents of the vessel are washed out, and made up to exactly 200 c.c. with water, and 20 c.c. are fixed with N/10 solution of iodine with starch as indicator.

N/10 iodine used = 2·7 c.c., which gives H_2S = 0·23 p.ct.

The CN is found by distilling a portion of solution with lead nitrate, the product being absorbed in carbon and titrated with silver nitrate (Feld's method).

7. *Gas Make.*

The quantity of gas (free of CO_2 and H_2S) in 13 is given by the weight of water displaced. This is, of course, water-saturated, and, for comparison, it must be converted into the equivalent at N.T.P. Make per ton is easily calculated. To find the total gas, including CO_2, H_2S, and CN, the volumes per ton of these can be calculated from the percentages, and added to the gas-make figure, after correction for temperature and barometer reading. Gas analysis, calorific value, and specific gravity are, of course, obtained in the usual manner.

In addition to a table of conversion factors for N.T.P., the

article gives tabulated results of various brands of German coals. For the practical application of values obtained by this method of analysis, the author gives the following hints, which are the outcome of many hundreds of actual comparisons between laboratory and working-scale results:

1. The coke make in practice is equal to the mean between the value found as above and that given by the ordinary crucible method. The nature of the residue in the tube gives a very fair indication of the quality of the coke obtainable.

2. The tar make in practice is generally slightly higher than that given by this method, and it is, of course, affected by the temperatures employed in carbonizing.

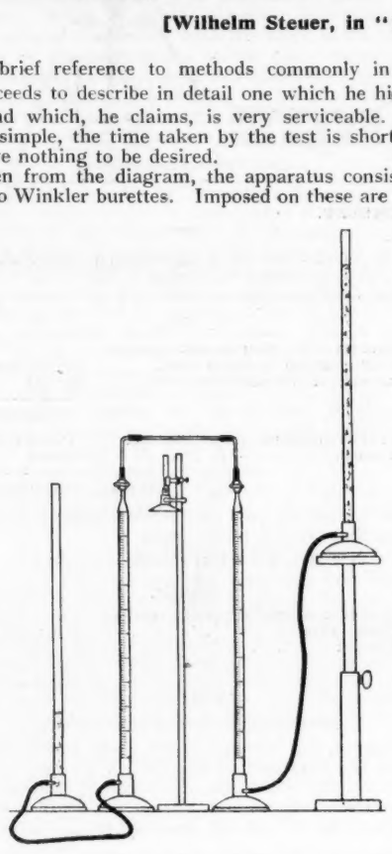
3. The actual ammonia output is 10 p.ct. less than the value as found experimentally.

DETERMINATION OF THE METHANE HYDROCARBONS.

[Wilhelm Steuer, in "Das Gas- und Wasserfach," May 22, 1926.]

After a brief reference to methods commonly in use, the author proceeds to describe in detail one which he himself has evolved, and which, he claims, is very serviceable. The apparatus is simple, the time taken by the test is short, and the results leave nothing to be desired.

As is seen from the diagram, the apparatus consists principally of two Winkler burettes. Imposed on these are two short



Steuer's Apparatus for the Determination of the Methane Hydrocarbons.

right-angled capillaries, which, in turn, are connected by a transparent quartz capillary about 10 cm. in length and 0·6 to 0·8 mm. diameter. In the middle of the quartz capillary there is a piece of thick palladium or platinum wire, about 3 cm. long. The gas to be tested is measured off in the first burette. With pure methane, 40 to 45 c.c. can be taken; with pure ethane, 25 c.c.; and with a mixture of the two, not more than 25 to 30 c.c. Into the second burette about 100 c.c. of oxygen are introduced. Then the cocks of both burettes are opened, and the bulk of the oxygen is allowed to pass into the other burette, while the catalyzer is heated by the flame of the bunsen burner. In this way, the combustible gas mixture becomes mixed with oxygen, and it is then allowed to pass again over the glowing catalyzer. This must take place very slowly, in order to obviate any risk of explosion; at first no more than 15 to 20 c.c. should be allowed to pass per minute. When the combustion of the bulk of the gas is complete, the catalyzer can be brought to bright red heat, and the gas passed backwards and forwards a few times at a quicker rate—say 100 c.c. in one to two minutes, until the volume remains constant.

Tests have shown that combustion takes place over palladium at a somewhat lower temperature than over platinum, and also it is accomplished quantitatively much more quickly. Constant volume is attained with palladium after three to five passages; while, with platinum, as many as ten are often required. It should, however, be noted that there is more risk of explosion with palladium when dealing with the hydrocarbons in greater concentrations, though the risk is entirely eliminated if every care is exercised in passing the gas slowly over the catalyzer. The combustion with ethane takes place at a lower temperature than with methane; so that, when dealing with the former, the catalyzer must be heated only to dull redness with a tiny bunsen flame, whereas it should be heated to bright redness with a full flame for methane.

The internal capacity of the capillary tubes does not amount to more than 0·1 or 0·2 c.c., so that it can be ignored for purposes of calculation. The oxygen used for the experiment should be such as contains no combustible impurities, so that there is no contraction in volume during the test from this cause. If it is desired to use electrolytic oxygen, a preliminary test should be made to ascertain what loss in volume there is when 100 c.c. are passed alone over the red-hot palladium, and a correction made in subsequent experiments.

The stoichiometrical equations for the combustion of methane and ethane are:

$$CH_4 + 2O_2 = CO_2 + 2H_2O$$
$$C_2H_6 + 3{\cdot}5O_2 = 2CO_2 + 3H_2O$$

If a mixture of methane and ethane contains x c.c. of methane and y c.c. of ethane, then:

$$x\,CH_4 + y\,C_2H_6 + (2x + 3{\cdot}5y)\,O_2 = (x + 2y)\,CO_2 + (2x + 3y)\,H_2O.$$

The total volume before combustion is	$3x + 4{\cdot}5y$
" " " after " "	$x + 2y$
Therefore the contraction C	$= 2x + 2{\cdot}5y$
The absorption A . . .	$= x + 2y$

$$y = \tfrac{2}{3}(2A - C)$$
$$x = A - 2y$$

From the last two equations the values of x and y are easily determined.

In tables I. and II. respectively are set out the values obtained for a test of methane alone and a mixture of ethane and nitrogen with 69·6 p.ct. of ethane.

TABLE I.

Methane c.c.	Methane Theor.	O_2.	Total Volume.	Contraction C.	Absorption A.	Methane Estimated C/2.	Methane Estimated ⅔(C + A).	Difference.
10·2	10·2	40·3	50·5	20·3	10·1	10·15	10·13	−0·1
18·8	18·8	43·5	62·3	37·6	18·6	18 8	18·77	−0·2
29·6	29·6	65·2	94·8	59·0	29·4	29·5	29 47	−0·2
40·5	40·5	91·5	132·0	81·2	40·4	40·6	40·53	−0·1

TABLE II.

Ethane c.c.	Ethane Theor.	O_2.	Total Volume.	Contraction C.	Absorption A.	Ethane Estimated ⅔ C.	Ethane Estimated A/2.
19·1	13·37	83·6	102·7	33·3	26·4	13·32	13·20
21·8	15·26	78·3	100·1	38·1	30·2	15·24	15·10
26·2	18·23	92·3	118·5	45·3	36·1	18·12	18 05
29·9	20·81	95·3	125·2	52·4	41·4	20·96	20·70

The author then shows the complete calculation for a methane-ethane mixture:

Methane (100 p.ct) . .	32·1 c.c. = 32·1 c.c. pure CH_4
Ethane (69·6 ") . .	6·3 " = 4·4 " " C_2H_6
Oxygen	94·2 "
Total volume .	132·6 c.c.
Reading after combustion	57·2
Contraction C .	= 75·4
Reading after absorption of CO_2	= 16·2
Absorption of CO_2 A .	= 41·0

$A = x + 2y = 41{\cdot}0$
$C = 2x + 2{\cdot}5y = 75{\cdot}4$
$y = \tfrac{2}{3}(82{\cdot}0 - 75{\cdot}4) = \tfrac{2}{3} \times 6{\cdot}6 = 4{\cdot}4$ c.c.
$x = 41{\cdot}0 - 8{\cdot}8 = 32{\cdot}2$ c.c.

Another table is included, comparing with the actual values those obtained by this method for three different methane-ethane mixtures, and illustrating the accuracy of the process.

Among the advantages claimed over other methods, the author points out that the complete test is carried out in much shorter time than usual; only 20 to 30 minutes being required.

A meeting of the Institution of Welding Engineers will be held at Caxton Hall, Westminster, on Monday, Nov. 29, at 8 p.m., when a paper entitled "Thermal Disturbance in Iron and Steel during Welding," illustrated by lantern slides, will be read by Dr. J. H. Paterson, F.I.C. The chair will be taken by the President (Prof. F. C. Thompson, B.Sc., D.Met., Professor of Metallurgy at Manchester University).

PNEUMATIC COAL CLEANING PLANT.

Messrs. John Bowes & Partners' Separation Plant at Wardley.

During the British Commercial Gas Association Conference at Newcastle, an official visit was paid, on Oct. 26, to the Wardley Colliery of Messrs. John Bowes & Partners. The purpose of this visit was an inspection of a large pneumatic separation plant—the second to operate in England—erected for the firm by the Birtley Iron Company, who are the sole licensees in Great Britain for the American Coal Cleaning Corporation, under the patents of Sutton, Steele, & Steele. Among the visitors were Viscount Ednam, Sir Arthur Duckham, Mr. Milne Watson, and Mr. Thomas Hardie.

General.

The plant is erected on Messrs. Bowes & Partners' private railroad which links up all their pits with their shipping staithes on the Tyne. It handles all coal screened through 2½ in. from their Follonsby and Springwell collieries. The coal produced at these collieries is of high volatile content, and is shipped to Continental and English gas undertakings. The plant was in operation for a short period prior to the coal stoppage, when the output ran as high as 145 tons an hour. It is intended, however, to operate it at a capacity of 125 tons an hour.

The Main Building.

The main building, which is shown in one of the illustrations that accompany this article, consists of three floors, with an over-structure housing the screens and the elevator head. One end of the building accommodates the dust extraction plant.

Screening Floor.

Raw coal is discharged from wagons into a 25-ton storage hopper fitted with a bottom outlet. It flows by gravity through a regulating gate into the boot of the main elevator, which is of the double-chain continuous bucket type, capable of dealing with 160 tons an hour. The elevator takes the coal to the top of the building, where it is delivered into a worm conveyor which distributes it equally over a pair of ½-in. screens vibrated at high periodicity. These screens are totally enclosed, to prevent escape of dust.

The oversize from these screens gravitates to an outboard screen, where it is divided into 1 in. oversize and 1 in. to ½ in. These products supply the hoppers feeding two of the six separators—Nos. 1 and 2. The undersize (½ in.) is delivered on to two ¼-in. screens, and the oversize from these is re-screened on an outboard ¼-in. screen, making ½ in. to ¼ in. and ¼ in. to ⅛ in. products, which supply two more separators—Nos. 5 and 6.

The undersize through the ¼-in. screens falls on to two 1/16-in. screens, whence the final product—⅛ in. to 1/16 in.—is fed to the remaining two separators—Nos. 3 and 4.

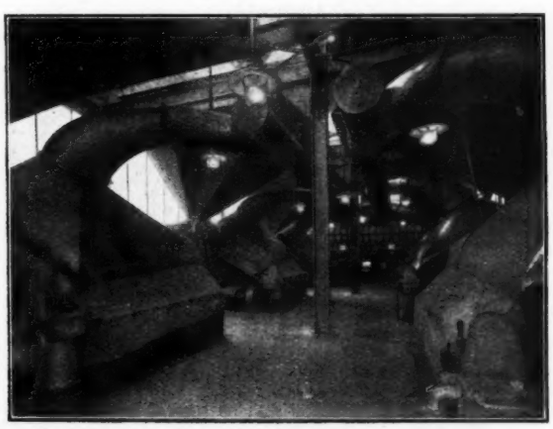
Sized-Coal Hopper Floor.

All eight screens—*i.e.*, six sizes—are on one side of the building; and there are six hoppers for the various sizes. Three of these are situated under the screens, and the sizes are fed into them by gravity; and the other three are situated on the other side of the building, the sized coal being fed to them by short belt conveyors, each of which has its own motor and reduction gearing.

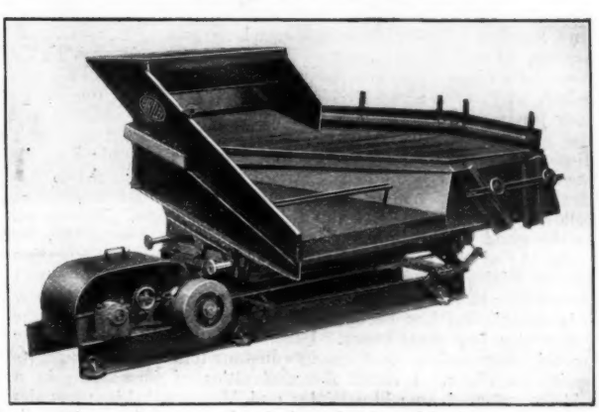
Worm Distributor and ½-in. Screens (covers removed) at Elevator Head.

Separator Floor.

As we have already mentioned, there are six separators. These are situated under the sized-coal hoppers—*i.e.*, three on each side of the building. Counting from the top, then, the separator floor is the third. This floor contains all the switch gear for controlling the operation of the plant.



Separator Floor.
Showing suction mains to dust extractor.



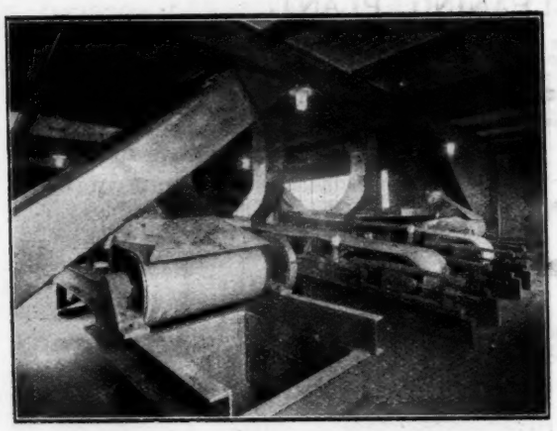
Birtley Pneumatic Separator (Type S.J. 60-84).

In the separators the coal is divided into three products—clean coal, middlings, and refuse. These products are separately conveyed down chutes to the next floor, upon which fans and motors are situated, where they are delivered on to belts.

Conveying Floor.

Two main clean coal mixing belts are totally enclosed, and connected to the suction side of the dust extractor system.

A similar belt conveys the middlings from all the six separa-



Belt Floor.

Showing No. 2 clean coal belt discharge in foreground.

tors on to a cross belt, which returns them to the raw coal elevator. Another belt carries the refuse from Nos. 3, 4, 5, and 6 separators on to a cross belt which receives in addition the refuse from separators Nos. 1 and 2, and conveys it outside the building, depositing it in a hopper.

Each belt—which is made of rubber—is a self-contained unit; and the whole of the conveying system runs on ball-bearing idlers in "Birtley" (dust and grease tight) housings. The running speed is 150 ft. per minute.

DUST EXTRACTION PLANT.

There are two suction mains along which the dust-laden air from the separators is drawn directly through a double-inlet fan of 75,000 c.ft. per minute capacity, and is propelled into two filter boxes. The air is filtered through fabric bags; the dust deposited falling into sealed hoppers.

The building is a steel structure with brick filling throughout, except in the case of the dust extractor house, the walls of which are constructed of wooden louvres, to allow a free passage to the filtered air.

POWER CONSUMPTION.

The Birtley Iron Company state that the power consumption for the plant is low—only one kilowatt-hour per ton of coal treated, including elevators, screens, separators, fans, and dust extraction plant.

WESTERN JUNIOR GAS ASSOCIATION.

The First Ordinary Meeting of the Association was held on Saturday, Nov. 13, in the Board Room of the Bath Gas Light and Coke Company, when Mr. C. BATEMAN presided over an attendance of fifty.

The PRESIDENT extended a hearty welcome to Mr. Madden, who then addressed the members.

ADDRESS.

By Mr. H. D. MADDEN, Engineer and Manager of the Cardiff Gas Light Company.

It has afforded me very great pleasure to attend the inaugural meeting of the Western Junior Gas Association. I am particularly pleased to be present, as I have many good friends in this part of the country, and your new President is one in whom I have taken a great deal of interest. In his earlier days he had the honour to serve at the great Beckton Works of the Gas Light and Coke Company, wherein it was my privilege to serve for some years previously. Afterwards he was selected, from a long list of applicants, as the Junior Assistant Engineer to the Cardiff Gas Light and Coke Company; and, while so engaged, he wrote a paper for the Senior Association, entitled "The Manufacture and Neutralization of Sulphate of Ammonia," which has been considered one of the reference papers on this subject during recent years. With the advent of the Institution's Education Scheme, your President presented himself for the first year in the Diploma stage, and it is gratifying to record that he passed with honours in this examination—utilizing and extending his paper on sulphate of ammonia manufacture as the basis of his thesis.

I sincerely hope that the future of this Association will be as great as that of Junior Associations formed in earlier years. One has read a good deal about the formation of the London and Southern Junior Association, which is so progressive, so strong, so educational, and so valuable to the industry. That Association had its origin under the shadow of St. Paul's Cathedral, in London; and I had the privilege of being one of the four juniors who stood there and discussed the possibilities and the grave difficulties which then attended the formation of a Junior Association. However, that day has passed; and instead of being difficult to run, there is keenness in that Association, which has now set out qualifications of membership, following on the lines of the Education Scheme. This is all to the good of the industry.

As one of the seniors who were interested in the formation of the Wales and Monmouthshire Junior Gas Association, I should like to tell you how difficulties were overcome, and how this Association has become virile and strong—all within the space of a few short years. I can speak with more authority on this Association, as I am in constant touch with it and its senior members. I recall the difficulties of formation, in a widely scattered area like Wales and Monmouthshire; but despite these difficulties, the Association has gone from strength to strength, aided by many enthusiastic members, whose number grows from day to day. The Association has already formed a library, and has the assistance and encouragement of the Wales and Monmouthshire Senior Institution; and I venture to think that what has been done in most difficult and scattered districts in South Wales, can be done equally as well by the Western Association, where you have better travelling facilities.

When the Wales and Monmouthshire Junior Association was formed, there was only one class for gas subjects in South Wales, and that was in Gas Supply, at Cardiff; but to-day we have, in addition, Gas Engineering and a full-course educational scheme, with cognate subjects to fulfil the conditions of the Institution of Gas Engineers' syllabus. I venture to say that the support given to these classes, and the strong numbers they attract, are very largely due to the influence of our recently formed Junior Gas Association, coupled with the encouragement and benediction of the Senior Association, who endeavour to get their juniors, from gasfitters' apprentices to technical assistants, to attend and take courses of education, so that they may be fitted in the years to come to attain higher positions. Our local Senior Association presents a long series of prizes to successful students, and also gives prizes for the papers read at the meetings of the juniors. Seventeen such prizes were distributed at the September meeting. I am sure that in this district the juniors will receive similar help and encouragement, and that they in turn will respond with greater interest and enthusiasm in the study of the sciences on which our great industry rests.

The development of gas-works practice calls for larger staffs of technically-skilled men. Chemistry, physics, and mechanical, electrical, and civil engineering, have their representation in practically every works to-day. What a scope for a junior and a student—vertical steaming, reclamation of waste heat, fireclay and silica work, and thermo-chemistry of retort houses. In distribution—mains and services—the ever-growing problems of supply and road construction, and congestion of the subsoil, call for very expert knowledge and specialized men; and it is regrettable to note that more attention has not been paid to this branch of our industry, comprising high-pressure governors, compressing plant, subsoils, causes and elimination of corrosion, &c. In point of fact, the returns of the Gas Supply Examinations, as published, reveal a grave shortage in this highly specialized and increasingly important branch. Let the West of England Juniors train their quantum, and fill the gap. Again, in the consumers' service branch, what an opening is available. Trade and industrial uses of gas form another group to attract the wise youth to study. This branch is barely in its infancy, and offers wonderful scope for investigation and application. Gentlemen, the field of investigation in the gas industry is wonderfully wide, and offers the juniors full scope, if they will but grasp the opportunities.

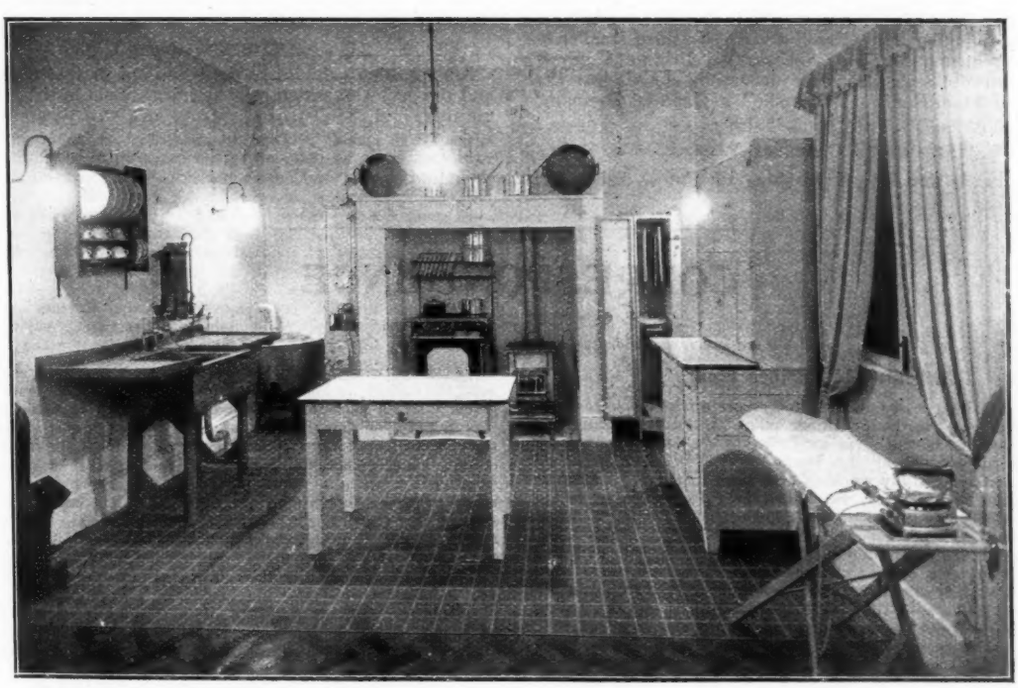
As one who has acted on the Institution Examining Board since its inception, I may be permitted to point out, from experience gained, the great value the scheme offers the individual. My colleagues and myself on the engineering side have noted with pleasure the advancement year by year of the quality of the papers; but I would suggest to you for your consideration the value of sketching neatly and clearly. Whether one is a gasfitter or a chemist, it is a valuable art.

May I urge you to be catholic in your membership, encouraging all ranks to assist you in your deliberations? The application and uses of gas are divergent; and the experiences of members from every branch are highly educational to the junior who may be specializing in one branch. They open up new lines of thought.

I bring you best wishes for a successful and strong Association from your colleagues in South Wales and Monmouthshire, who will watch with great interest and pleasure your development; and, as our nearest neighbour, perhaps co-operation may from time to time ensue between these two Junior Associations.

In conclusion, I would remind you of the phrase "Quit you like men," and offer my own sincerest wishes for a strong and successful West of England Junior Association.

GAS AT THE COOKERY AND FOOD EXHIBITION.



VIEWS OF THE GAS LIGHT AND COKE COMPANY'S EXHIBIT.

Judging by the attendance and by the quality and number of the stands, the twenty-ninth Universal Cookery and Food Association Exhibition, held from Nov. 12 to 19, was a pronounced success, and therefore should have done much to further the object of its promotion—namely, "to awaken public interest in the Art of Cookery, and place it in a position worthy of its increasingly vital importance to national health and progress." The Association is an influential one, having as its Chief Patroness Her Majesty the Queen. The President is the Hon. Sir Derek Keppel, G.C.V.O., C.M.G., C.I.E.; while among the Vice-Presidents is Mr. F. W. Goodenough, C.B.E. The Chairman of the Executive Committee is Lieut.-Col. S. Wright, O.B.E., Inspector of Army Catering; and the Hon. Treasurer, Mr. J. E. Henwood.

Owing to the success that had attended previous exhibitions staged under the Association's auspices, this year's display was arranged on more ambitious lines. The Royal Horticultural Hall, at Westminster, having become too small to accommodate the yearly increasing number of visitors and exhibits, a move this year was made to the New Hall at Olympia; and the Committee are to be congratulated upon having taken this step, as even the increased space thus provided proved none too much to meet the requirements.

The exhibits were of a varied character; and the work of the chefs from the great hotels and restaurants represented some of the finest examples of the science of cookery that had ever been shown. The entries in the numerous classes, by the trade, hospital nurses, and housewives were not only more numerous than in previous years, but abundantly proved the value of education in the science of cookery which is being so strongly supported by the Gas Light and Coke Company, as well as other gas undertakings. In this connection, it may be mentioned that the lengthy list of special prizes included £50 by the Gas Light and Coke Company for prize medals, &c., for economical cookery. There were three demonstration theatres, one of

which was occupied during the week by competing teams of the Navy and Army for the much coveted challenge shields; the Army winners this year being the Royal Horse Guards, Regent's Park Barracks. In the other theatres there were various competitions, and daily lectures and demonstrations on different branches, including household cookery.

It is hardly necessary to say that gas, as usual, was strongly represented in the exhibition. Some twenty-five stallholders utilized this method of heating in connection with their displays; and, of course, gas cookers were employed for the demonstrations and competitions. For the Army cookery competitions, there were Wright's "Eureka," Cannon Company's "Challenge," Parkinson's "Suburbia," and Sugg's "Chef" cookers; in the demonstration theatre, Wright's "Eureka," Main's "Maintenance," and Richmond's "Bungalow" cookers, together with a Ewart's "Califont" for supplying hot water; while in the lecture theatre were fitted two "Standard" cookers.

GAS LIGHT AND COKE COMPANY.

The Gas Light and Coke Company had a display which, judging by the attention it created, must have been one of the most successful in the exhibition. There were depicted a model dining room and a model kitchen—each such as the modern housewife of taste and intelligence would regard as perfection. The dining room, tastefully furnished in Jacobean style by Messrs. John Barker & Co., of Kensington, was provided with a Davis 14-in. "Medusa" fire in copper, with Nautilus overmantel and recessed tiles; the fire being fixed with all the piping concealed. The lighting fittings (which included a standard floor lamp and table lamp) were fully in keeping with the surroundings, having been judiciously selected to demonstrate the adaptability of that method of illumination to this popular style of decoration. In the kitchen, though (like the dining room) it measured only 10 ft. 6 in. by 12 ft., there was plenty of room, with all the aids to labour saving and convenience that were provided. In the recess were a Fletcher's "Kingsway" cooker and a Nautilus coke boiler; the recess having at one side of it a Potterton gas boiler (No. 921 builder's set), and at the other an "Eco" dryer. To meet smaller hot water requirements there was a Ewart's "Brilliant" geyser; while other useful suggestions for the up-to-date kitchen were to be found in a Davis's "Burnall," a Cannon Company's "Corna" copper, and a Davis's gas iron.

"SPLENDID" CROCKERY WASHER.

In large establishments the washing of plates, dishes, &c., is a problem to which a good deal of attention has been devoted; and the Staines Kitchen Equipment Company, Ltd., exhibited at work a machine of new design which has been designed and patented by them as the outcome of long and careful experiment. In the first place, of course, an efficient supply of hot water is needed; and this at Olympia was provided by two Potterton "Victor" gas boilers and cylinders. The "Splendid" machine, which is British throughout, washes, not by means of sprays, but by pure rubber brushes, so arranged and shaped that every particle of food is swept off each plate as fast as the operator can feed the machine. The brushes cannot become clogged; the very speed at which they revolve through the water prohibits this. While every part of the machine with which a plate might come into contact is rubber or rubber-covered, the washing unit is so designed that at no time does one piece of rubber touch another—thus obviating serious friction and wear. The power is obtained from an electric motor of one-half horse power; and should the power supply fail, the brushes are removed in a few seconds, leaving a plain hand washing-up sink, in place of the inaccessible tank of the spray machine.

THE ICE STOVE.

The use of gas for refrigerating purposes is another matter to which a good deal of attention is being given at the present time; and it was adequately represented at the exhibition. In addition to the "Electrolux," which has already been described in the "JOURNAL," the Ice Stove Company, Ltd., had several models on view. The "Ice Stove" system of refrigeration is claimed to embody all the good features of the absorption process, together with a number of patented improvements of importance. It is made in a portable form, and also in larger sizes which are entirely automatic. In either case a small amount of gas will supply all the heat that is required; and with the automatic pattern the only attention required is to turn on the gas, say in the morning. The by-pass then lights it up, and when the heat has done its work—which is stated to be after the consumption of about 40 c.ft.—the gas is automatically turned off.

OTHER EXHIBITS.

Among other exhibitors, Mr. F. Adami showed the gas cooker and the griller to which reference was made in the "JOURNAL" recently, and the Carron Company and Anti-Waste Appliances, Ltd., their special makes of cookers. Messrs. Still & Sons exhibited their toasters and grillers; and Messrs. Stott & Co., their ham boiler and coffee making sets.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Carbonizing Chamber Plant.

SIR,—We are interested in seeing the report of the official opening of the intermittent vertical chamber plant at the Ramsgate Gas-Works, on account of the great similarity to the Leeds intermittent plant which we erected at the Taunton Gas-Works in 1921, and which has been successfully working ever since that date. After the first installation was erected, we added, in 1923, a further bed of ten retorts, which makes the complete installation capable of carbonizing 66 tons of coal per day.

In the Taunton setting, the retorts are smaller than those at Ramsgate, holding 17½ cwt. each, and are set in rows of two, these being charged at one time; so that if two retorts were merged into one, and the present space between the two retorts occupied by the charge, the Taunton setting would be about identical.

The arrangements for charging and discharging the retorts are similar, with the exception that we have one door at the top of each retort instead of three as at Ramsgate.

The retorts are made of silica, and have carbonized all classes of coal, including Somerset and South Wales slacks, for which coals this type of plant is particularly suitable; and the advantages claimed for the Ramsgate installation may also be claimed for the Leeds intermittent type, which has been in operation so long.

GOODALL, CLAYTON, & CO., LTD.,
C. A. GOODALL, Managing Director.

Hunslet, Leeds,
Nov. 22, 1926.

Where are the Students?

SIR,—The leading article in your issue of the 17th inst., entitled "Where are the Students?" calls attention to a very apparent weakness in the support given to the training centres, which appears to be due to a lack of interest on the part of the students.

It would seem, however, that the responsibility for this must, to some extent, be attributed to the District Associations. The Wales and Monmouthshire District Institution have endeavoured, during the past three years, to support the Institution's Education Scheme in every possible way, and have encouraged the technical juniors in the area to attend classes, notwithstanding the difficulties of travel in a scattered and mountainous area such as ours. As a District Institution, they (with a Sub-Committee) co-operate, and keep in touch, with the college authorities; and during the past two years they have given a series of prizes for students who pass in Gas Engineering, Gas Supply, or Gas Fitting, as well as to other students who are reported by the college authorities or the chief of their undertaking to have done exceptionally good work in cognate or other subjects. Additionally, when a junior passes the Higher Grade in either Gas Engineering or Gas Supply, he is immediately entitled to membership of the Institution. This has been beneficial, and has encouraged students from the ranks of the technical and outdoor staffs to take the courses of instruction which have been arranged.

It is also apparent that there is a class of man who, by reason of age, cannot hope to take the Institution's examinations. He, also, is catered for, and encouraged to attend; and at the end of his course, he is able to sit for the college examinations for which certificates are awarded. Such certificates are recognized by the local undertakings; and it is all to the good of the industry that such men, who would otherwise not take a course of study, should have an opportunity of obtaining some certificate to the effect that they have done so, and passed a college examination.

Our District Institution are keen on this matter, and will carry on further—continuing to give every encouragement to the juniors—because the members recognize that it is to the ultimate benefit of the industry. It is felt that, if the District Associations will do all they can in this matter, and assist in every possible way the Junior Gas Associations, our industry will, in the future, be fully equipped to meet all eventualities.

It may be asked if the students are benefiting. The answer is "Most certainly." Some of the students who have taken courses have received higher appointments in their own undertakings; and, during the past two years, a number have also received higher appointments in undertakings in other parts of the country.

These results have had a most encouraging effect on the remaining students, who are working hard to emulate the example.

OCTAVIUS THOMAS,
Hon. Secretary,
Wales and Monmouthshire District Institution of Gas Engineers and Managers.

Gas Offices, Pentre, Rhondda,
Nov. 20, 1926.

REGISTER OF PATENTS.

Heat Treatment or Carbonization of Coal.
No. 253,498.

INTERNATIONAL COMBUSTION ENGINEERING CORPORATION, of New York (Assignees of W. RUNGE and E. A. PACKARD).

No. 12,590; May 17, 1926. Convention date, June 12, 1925.

This invention is a modification of that described in specification No. 242,621 [see "JOURNAL," Vol. 175, p. 146], and relates to the manufacture of a smokeless fuel having certain characteristics, hereinafter defined, and to a mode of using the fuel. It consists in subjecting pulverized coal to a heat treatment under conditions which produce a finely sub-divided semi-coke "in which most of the particles have been converted into spheroids substantially hollow with shell-like structures and many of them having windows in their surface;" the resultant fuel being particularly active fuel, and adapted for burning in a furnace in suspension in air.

The heat treatment may be conducted in the known manner of suspending the pulverized coal in a gaseous medium and in a zone wherein the temperature is sufficient to effect low-temperature carbonization, thereby driving off a substantial portion of the hydrocarbon volatile content of the coal; the conditions being such, however, as to give a product having the characteristics broadly defined above.

The patentees prefer, however, to conduct the heat treatment in two stages. The pulverized coal is first treated to drive off only a small percentage of the hydrocarbon volatile content, and at the same time to cause the coal particles to become smooth and rounded and of slightly increased size. The pretreated coal is then subjected to carbonization.

The pretreatment is carried out at about 600° Fahr., and the carbonization at about 1000° Fahr. The specification includes a diagrammatic resprentation of suggested plant, and also reproductions of microphotographs of coal particles to illustrate the characteristics sought for.

Cracking Fuels.—No. 253,499.

INTERNATIONAL COMBUSTION ENGINEERING CORPORATION, of New York (Assignees of W. RUNGE).

No. 12,710; May 18, 1926. Convention date, June 12, 1925.

This invention relates to a process of carbonizing or cracking fuel in a retort in which the output of hydrocarbons of comparatively low boiling-point is enhanced by causing vapours of liquids of comparatively high boiling-point produced by the cracking to condense within the retort and to return to the heating zone.

For this purpose the finely subdivided fuel is showered into the upper part of the retort, and there is created above the heating zone a cooling zone of such temperature that the required condensation occurs and the liquid produced either descends in separate drops into the heating zone or is carried into the latter on or as a part of the descending fuel.

The heating zone is kept at a temperature of about 1050° Fahr. by the ascending gases; and the cooling zone at about 300° Fahr. by means of cooling gases introduced part-way up the retort. The specification describes and illustrates suitable plant for the treatment of pulverized coal and finely divided oil.

Neutralizing Commercial Sulphate.—No. 259,669.

COKE AND GAS OVENS, LTD., of Vincent Square, S.W. 1, and PEARSON, R., of Tingley.

No. 18,027; July 14, 1925.

This invention for neutralizing the free acid which exists in commercial sulphate of ammonia consists broadly in that the sulphate is passed, while being heated and submitted to the action of an alkali, in series through a plurality of long horizontal compartments disposed one above the other, first in one direction along the uppermost compartment, then by gravity into the next, then in the opposite direction, and so on.

The apparatus employed is clear from the drawings which we reproduce. It will be noticed that heating is by means of vertical steam chambers flanking the horizontal compartments, and that rollers are provided to crush any salt that passes the screws without disintegration.

Neutralization may be by ammonia gas admitted at a point in the bottom compartment adjacent to the outlet opening, and being adapted to flow in a direction counter to that of the sulphate; any excess escaping at a point adjacent the inlet opening. In order to prevent the atmosphere being polluted by the ammonia gas, it is adapted to be drawn by suction instead of forced by pressure. For the same reason the openings are provided with cover plates, which are only opened from time to time.

Alternatively, neutralization may be by soda ash or other similar solid alkaline material, which in this case is admitted in predetermined quantities at the inlet and is conveyed, together with the sulphate, through the machine.

Control of Gas Lighting Systems.—No. 260,079.

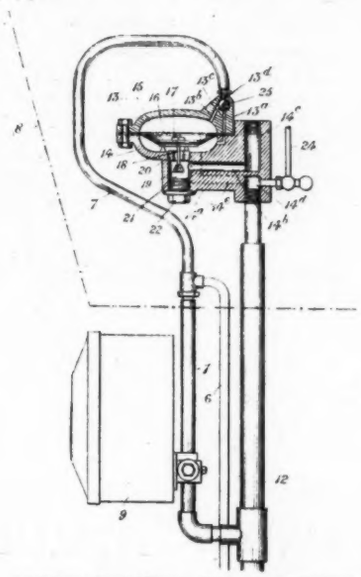
EVERED & CO., LTD., of Smethwick, and BARNES, F. V., of Todmorden.

No. 22,699; Sept. 11, 1925.

This invention relates particularly to that form of gas lighting system wherein each lamp or each group of lamps of a series of lamps is or are provided with a control valve or valves, each of which has connection with, and is adapted to be actuated by, a common control mechanism.

The patentees refer to the system wherein, upon the operation of a control valve, one side of a diaphragm is placed in connection with the atmosphere, thereby disturbing the balance of pressure on the diaphragm and permitting the opening of the valved means and the consequential lighting of the lamps.

By the present invention, the opening of the gas valve or valves and the consequential lighting of the lamp or lamps is permitted

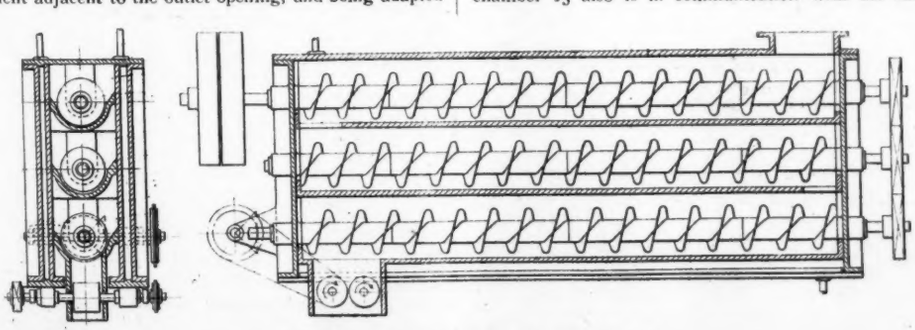


Lighting Controllers.—Evered and Barnes.

upon a balance of pressure obtaining on the diaphragm or diaphragms of the valve or valves; the balance of pressure being effected by admitting gas to one side of the diaphragm or diaphragms by the actuation of the common control mechanism.

The invention will be clear from the part-sectional elevation of the upper portion of a control lamp reproduced; and the description of the working of the installation.

The time at which it is desired to effect the lighting of the lamps is determined by setting the clock 9 in the normal manner; and when the time is reached, the clock mechanism effects the opening of a valve which admits of gas from the main supply 12 passing by way of the clock control to the pipe 7 in communication with the upper section of the hollow chamber 15. This admission of gas to the upper side of the flexible diaphragm 16 results in an equal pressure obtaining on each side of the diaphragm, since the lower section of the chamber 15 also is in communication with the main supply 12 by



Sulphate Neutralizer.—Coke and Gas Ovens, Ltd.

way of the passage 14c in the boss-like portion 14a of the member 14. The establishment of an equality of pressure on each side of the diaphragm 16 permits the weight of the valve stem 18 to pull the diaphragm down and thereby cause the conical valve member 19 to fall away from its seat in the plug 20; thereby placing the passage therein in communication with the cylindrical recess 21 and passages 14b 14c, and thence to the burner. The actual combustion of the gas is effected by a pilot jet.

When it is desired to put out the lamps, the reverse process takes place. The clock mechanism 9 at the determined hour effects the closing of the valve and thereby cuts off the gas supply from the upper side of the flexible diaphragm 16, and releases the pressure therefrom by way of the by-pass 7. This cutting-off of the gas supply and release of the pressure on the upper side of the diaphragm results in the pressure on the underside of the diaphragm becoming greater than the pressure on the upper side; and the diaphragm 16 is lifted and carries with it the valve stem 18 and conical valve member 19.

The pipe 6, which interconnects the several lamps with the controlling lamp 8, is connected to the by-pass 7 of the controlling lamp at a point intermediate the clock control and the control valve.

In order to admit of the testing and cleaning of individual lamps without the necessity of lighting the whole series of lamps operated by the main control, the three-way valve 25 is operated, whereby gas from the underside of the diaphragm may be admitted to the upper side of the diaphragm and effect the equalization of pressure, thereby permitting the conical valve member 19 to fall from its seating and to admit gas to the burner.

In a modification, instead of the control being effected by means of a clock mechanism, the control of the series of lamps may be effected through a manually operable cock.

Passages in Gas Meters.—No. 259,376.

SIMPSON, S., of Exmouth.

No. 24,839: Oct. 6, 1925.

According to this invention the whole of the horizontally disposed gas passages connecting the valve ports with the diaphragm and with the meter outlet are arranged above the valve plate. Thus, passages of large area may be used, and repairs are facilitated. Other features are that the outlet passages from the valves are provided of an inverted trough form; and each of the passages leading from the inner ports of the valves communicates with the inner side of the diaphragms by means of a passage formed solely by pressing out from the rim carrying the diaphragm.

Distillation of Tar.—No. 253,935.

AB-DER-HALDEN, C., of Nomexy (Vosges).

No. 15,432; June 18, 1926. Convention date, June 22, 1925.

In specification No. 239,841 [see "JOURNAL," Vol. 174, p. 49] was described a method for the continuous distillation of tars, &c., according to which the raw material to be treated is mixed with the mass of the residue of a preceding distillation; the raw material being preliminarily heated—for instance, by exchange of heat with the residue—and the mass being energetically stirred by a current of vapour or suitable gas.

This invention is a modification of the above. In addition to the *modus operandi* described therein the water contained in the raw material to be treated is further caused to circulate in the state of vapour through the residue, and thus aids in the distillation. In practice, this result is attained by supplying the hot raw material into the mass of residue contained in the distilling retort; and this by extending into the mass of residue the piping through which the raw material is supplied.

Low-Temperature Distillation.—No. 259,295.

TRAVERS, M. W., of Queen Victoria Street, E.C. 4, and CLARK, F. W., of Warrington.

No. 17,353; July 6, 1925.

This invention relates to the low-temperature distillation of coal with superheated steam, and has for its object a process by which a maximum yield of volatile products is produced with a minimum yield of gas.

In the process, superheated steam is passed through the retort, and the dirty steam therefrom, instead of being reheated and returned to the retort, is caused to give up sensible and latent heat for the generation of clean steam. Preferably the dirty steam is first of all desuperheated by spraying it with hot water; and then the uncondensed steam is compressed in a thermo-compressor before being passed to a heat exchanger to generate clean steam. The condensed dirty steam is further utilized to heat feed water.

The temperature of distillation is preferably below 600° C.; and the clean steam may be heated partly in a superheater and partly in the process of cooling the solid product of distillation of the fuel.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Nov. 17.]

Nos. 27,970—28,665.

BIRKS, F. M.—"Apparatus for delivering quantities of coal from hoppers." No. 28,202.
BOWATER, N. J.—"Manufacture of water gas." No. 28,166.
CARR, W. M.—"Production of coal gas." No. 28,649.
GAS LIGHT AND COKE COMPANY, LTD.—See Birks, F. M. No. 28,202.
HOLLIS, H. H.—"Valves for gas purifiers." No. 28,126.
KERR, F. F.—"Generation of gaseous power fluid." No. 28,613.
LEECH, W. J. B.—See Birks, F. M. No. 28,202.
MASE, R. P.—"Apparatus for determining given constituent of mixture of gases." No. 28,069.
MISCH, O.—"Process for producing a mixed gas." No. 28,055.
MITCHELL, F. B.—"Safety gas taps." No. 28,003.
MULLER, K.—"Method of purifying gases." No. 28,321.
OROCHI, M.—"Process of collecting benzene, &c., from coal gas." No. 28,564.
TOMSON, A.—"Apparatus for purifying gases." No. 28,638.
TRUMBLE, M. J.—"Treating carbonaceous material." No. 28,563.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Special Orders.

Gloucester Gas Order: Referred to the Special Orders Committee.

Farnham, Godalming, Hampton Court, Herne Bay, Salford, United District, and Widnes Gas Orders: Report from the Special Orders Committee that no petition had been presented against these Orders, and that there was nothing in them to which to call the attention of the House.

HOUSE OF COMMONS.

Gas Regulation Act.

A copy was presented of a draft of a Special Order proposed to be made by the Board of Trade under the Act, on the application of the Gloucester Gaslight Company.

Imported Coal.

Replying on Nov. 11 to Sir W. Lane Mitchell, who asked the Secretary for Mines if he would arrange for all imported coals to go to public authorities, gas, electricity, and railway companies, and confine home-produced coals to domestic use at a fixed price, Viscount Curzon (who replied for the Secretary for Mines) said that the suggestion had been carefully considered, but great practical difficulties were seen in its application.

Lighting Restrictions.

The question of the lighting restrictions was raised in the House of Commons on Nov. 16. Sir Walter de Freece asked the Secretary for Mines whether he was prepared to grant greater latitude to shopkeepers in the matter of illumination; while Mr. Forrest stated that the Regulations were being differently interpreted all over the country, and that the cutting down of lighting facilities was having a detrimental effect on some businesses. There was no limitation, Mr. Forrest said, to the amount of illumination used in private houses.

Col. LANE FOX, in the course of his reply, said that it was difficult to secure uniformity in the interpretation of the directions, and for that reason he recently had a circular letter sent to local authorities and chief constables on the subject. He realized the inconvenience and loss which was being borne by the trading community; and he hoped that, with the improvement in the coal situation, it would soon be possible to remove the restrictions.

Lighting of Arterial Roads.

Mr. R. MORRISON asked the Minister of Transport whether he had considered the question of the inadequate lighting of arterial roads, and if any experiments in highway illumination were being carried out by the Ministry.

Col. ASHLEY said that the lighting of highways was a matter for the local authorities concerned; and it was hoped that, when financial conditions improved, a higher standard of lighting would be adopted by the less advanced authorities. At the present time, no experiments were being conducted in highway illumination. Replying to a further question by Mr. Morrison, Col. Ashley stated he was advised that he had no powers under the Roads Improvement Act passed last year to make experiments in the lighting of arterial roads.

Gas Extensions at St. Ives.—The Ministry of Health lately held an inquiry at St. Ives (Cornwall) into an application by the Town Council for permission to borrow £6050 in connection with the gas undertaking—£2326 being required for improvements at the works, and £3724 for laying district mains, &c. It was stated that three new building estates were being developed in the town, upon which it was expected 500 houses would eventually be erected, and that applications for new gas services were being continually received. Mr. F. R. Grant (the Gas Manager) told the Inspector that new retorts, purifiers, engine, and exhauster, &c., were required at the works. He said he was unable to predict what effect this new plant would have on the price of gas, and could not agree that the demand for gas would be less in consequence of the keen competition of electricity. It was mentioned that the gas undertaking had always showed a profit, with the exception of the year 1919.

MISCELLANEOUS NEWS.

GAS COMPANIES' PROTECTION ASSOCIATION.

ANNUAL GENERAL MEETING.

The Twenty-Ninth Annual General Meeting of the Association was held on Tuesday, Nov. 16, in Caxton Hall, Westminster, under the Chairmanship of Mr. R. W. EDWARDS, of Aldershot (the Vice-Chairman), in the absence through indisposition of Dr. Charles Carpenter, C.B.E.

The register of attendance showed that those present on the occasion included Messrs. George Anderson (Dover), R. J. Auckland (Cardiff), C. M. D. Belton (Shrewsbury), C. F. Botley (Hastings), A. W. Brookes (British Gas Light Company), W. E. Caton (Oxford), William Ellis (Chichester), D. H. Helps (Reading), W. Phillips (Luton), W. F. Whittaker (Grays and Tilbury), and G. W. Willmott (Wandsworth, Wimbledon, and Epsom).

The ASSISTANT SECRETARY (Mr. R. G. Cooper) read the notice convening the meeting, and the minutes of the last meeting, which were duly confirmed.

THE CHAIRMAN'S INDISPOSITION.

The SECRETARY (Mr. F. E. Cooper) read a number of apologies for absence. Dr. Carpenter had written a letter, dated Nov. 14, in the course of which he said:

> I am recovering from an attack of ptomaine poisoning, and had hoped to be back at work next week as usual.
>
> My doctor tells me this morning, however, that I must not think of keeping any of my engagements next week—or, indeed, until I have been away, which he will not permit before Wednesday.
>
> It is very disappointing to me not to be able to take the chair on Tuesday, as it is really the only opportunity I have to endeavour to justify my stewardship of the Association.

Another letter was from Mr. Reginald G. Clarry, M.P., who wrote:

> I am much obliged for the Gas Companies' Protection Association Committee's report—which makes most interesting reading—and much appreciate the paragraph which you have kindly put in with reference to my small services.
>
> I should much like to have attended the meeting; but unfortunately I have mass meetings at Newport at which the Home Secretary is speaking, and so shall not be in London.
>
> I hope you will have an entirely successful meeting, and a further year of useful work for the Association.

ANNUAL REPORT.

The annual report of the Committee was as follows:

The Committee herewith present the revenue account and balance-sheet, together with a report of the proceedings for the year ended Sept. 30, 1926.

The ascertained expenditure amounted to £431 9s. 4d. The revenue was: Subscriptions and donations, £493 10s.; interest on War Loan, £72 10s.—amounting together to £566; and leaving a surplus for the year of £134 10s. 8d. From the balance-sheet, it will be seen that the assets amount to £2006 6s. 6d., consisting of £1450 5 p.ct. War Loan, 1929-47, at cost, £1377 10s. (the value of which at the date of this report is £1476 5s. 6d.); balance at bank, £622 16s. 5d.; and cash in hand, £6 0s. 1d. Since Sept. 30, 1925, the subscriptions then in arrear have been paid. The amount outstanding in respect of unpaid subscriptions for the year covered by the accounts is £30 18s., of which the sum of £27 6s. has been received since the closing of the accounts.

As regards the amount of subscriptions received during the past year, it may be mentioned that the attention of the Committee was called to the fact that, while the authorized capital of some member-companies had been increased since they first joined the Association, the amount of their subscriptions had not been increased in accordance with the scale in Rule 7. The Secretary was, therefore, instructed to draw attention to the said scale in his circular letter requesting payment of subscriptions. As a result, several companies have paid increased amounts, and the income of the Association under this head has been increased by more than 10 p.ct.

At a meeting of the Committee held early in October, 1925, the question of the Association tendering evidence before the Royal Commission on the Coal Industry was considered. It was resolved that a request should be made to the Secretary of the Commission that the Chairman of the Association should be called as a witness on behalf of the Association. The request was readily granted. The Chairman attended before the Commission, and gave his views on the coal question as affecting gas companies. He supported his evidence by tables and statistics, and stressed the necessity for the collieries turning out clean coal for gas-making purposes, and the importance of the development by the industry of coal carbonization as a means of producing coke, which would be, for domestic uses, a substitute for coal. Before leaving the witness-box, the Chairman answered numerous questions put to him by members of the Commission, the Mining Association, and the Miners' Federation.

The Electricity Supply proposals of the Government received the early and earnest attention of the Committee. The Chairman, and Secretary, and a number of members of the Committee (elected by ballot), attended a conference convened by the Minister of Transport, when the Government scheme, as outlined by the Prime Minister, was explained to representatives of the gas industry. The offer of Mr. A. Hugh Seabrook, M.I.Mech E., M.I.E.E., M.Inst.GasE., to give his assistance in the formulation of objections, was accepted by the Committee, who take this opportunity of cordially thanking him for his help and advice. At a special meeting of the Committee, held at Caxton Hall, the Government's proposals were carefully considered and discussed. Mr. Seabrook laid his views before the meeting, and stated how these proposals were regarded by electrical experts generally. The Committee came to the conclusion that there were only two points to which objection could be raised by the industry—viz., the too sweeping powers which it was proposed to confer on the Electricity Commissioners, and the Government guarantee, which they regarded as in the nature of a subsidy. A circular was sent out to members of the Association, stating shortly the Committee's objections to the Bill, with a request that it might be brought before the Boards of the various companies at their next meeting.

Mr. Reginald G. Clarry, M.P., who was a member of the Standing Committee of the House of Commons appointed to consider the Electricity (Supply) Bill, was unremitting in his efforts to secure fair treatment for the gas industry. In order to set some limit to the far-reaching powers of the Electricity Commissioners—one of the Association's chief objections to the Bill—Mr. Clarry brought up a new clause, under which, in the event of the Electricity Commissioners deciding that they were unable or unwilling to make an Order for electricity supply applied for by a gas company, the matter should be referred to the Minister of Transport, and any Order so made by him should have effect as if it had been made by the Electricity Commissioners and confirmed by the Minister of Transport. Mr. Clarry was successful in getting this provision added to the Bill, in which it appears as Clause 42 (Special Provisions as to Gas Undertakers).

An important question raised by the Vice-Chairman was the expediency of making representations to the Board of Trade with a view to securing the stabilization of therm prices. A valuable memorandum on the subject, prepared by Mr. G. W. Anderson, was laid before the Committee; and, at the Chairman's request, Mr. E. Campbell Cooper, of the firm of Messrs. R. W. Cooper & Sons, Parliamentary Agents, advised the Committee as to the procedure which the Association could adopt. This matter is still receiving the attention of the Committee.

The Committee also considered whether representations should be made to the Board of Trade as to granting Special Orders under the Gas Regulation Act containing basic price provisions—the fundamental idea of which was that a gas company was entitled to a fair return on its capital, irrespective of the price necessary to be charged for gas; the objects of these provisions being to give security for capital, and thereby to facilitate the raising of additional capital by gas companies. In accordance with a resolution of the Committee, the Chairman, Mr. Charles F. Botley, and the Secretary, attended the Director of Gas Administration, and in a long interview urged that the basic price provisions should be granted by the Board of Trade in Special Orders, in the interests of consumers as well as of shareholders in gas companies. After some discussion, the Director stated that he would communicate the Association's views to the Board. The Board have not yet seen their way to grant Special Orders containing the said provisions; and it is within the knowledge of the Committee that the Board, subsequent to the interview with the Director of Gas Administration above referred to, refused to entertain an application by a gas company for a Special Order in which it was proposed to insert such provisions.

The Income-Tax Sub-Committee have during the past year met on several occasions and dealt with income-tax questions; and their Chairman, Mr. Charles F. Botley, whose experience and judgment in Inland Revenue matters have proved of extreme value to many members requiring assistance in such matters, and the Secretary, have also advised members on various points relating to income-tax.

One case which received the attention of the Sub-Committee was a contention by the Board of Inland Revenue that holders of tax-free debenture gas stock, which, by the terms of its creation, was to bear interest tax free, could not recover income-tax in respect thereof, though they were not assessable for income-tax. The Sub-Committee deemed the matter an important one of principle; and the Secretary, with the consent of the Chairman, afterwards ratified by the Committee, was requested to instruct the Solicitors to the Association to obtain the opinion of Sir Stanford London, C.B.E. This was done; and a copy of his opinion was furnished to members of the Committee.

The Inspector of Taxes for the district in which the Association's offices are situate claimed that the Association was liable to pay income-tax on the £131 5s. appearing in last year's accounts as a contribution by the Association to the expenses of the Horley District Gas Company (Electricity Supply) Bill, 1925, on the ground that, if the amount in question had been paid by the Horley Company, it would be a capital, and not a revenue, charge. The Secretary contended, both by correspondence and at a personal interview with the Inspector, that this matter was covered by the decision of the Income-Tax Commissioners, given on the Association's appeal referred to in the report of the Committee for the year 1924; and ultimately the Inspector withdrew his contention.

The common form of clause for the protection of local authorities, to be inserted in Private Bills and Orders promoted by public utility companies, which is being drafted by the Standing Joint Committee on Mains and Cables in Highways (on which Joint Committee the Association is represented), has not yet been finally settled. A draft of the clause in its latest form was laid before the Committee in July, and approved subject to an amendment in sub-clause (3) suggested by the Secretary.

It is with regret that the Committee record that, in consequence of the absorption of the Brentford Gas Company, Mr. A. A. Johnston has resigned his position on the Committee, after a membership of fourteen years. Mr. Johnston was elected to the Committee in 1911, after having rendered valuable assistance as a member of the Committee and Sub-Committee on the Gas Companies (Standard Burner) Bills, 1910. In recognition of his great services to the gas industry, Mr. Johnston was requested by the Committee to continue his connection with the Association by becoming a Vice-President, which he has expressed his willingness to do. The vacancy on the Committee occasioned by Mr. Johnston's resignation has been filled by the appointment of Mr. W. E. Caton, General Manager and Engineer of the Oxford Gas Light and Coke Company. Mr. R. J. Auckland has been appointed one of the Association's representatives on the Central Executive Board of the National Gas Council, *vice* Mr. Johnston.

As in past years, the assistance of the Secretary has been largely requisitioned by officers of member-companies seeking information and advice. Some letters dealing with matters of exceptional difficulty or importance have from time to time been laid before the Committee and Income-Tax Sub-Committee; and inquirers have, therefore, had the benefit of the opinions of those bodies, arrived at after consideration and discussion. The following are the most important of the subjects upon which the Secretary has been consulted: Rate to be charged for gas where prepayment meter had stopped; conditions imposed on company as to measurement of trenches; income-tax in respect of costs of promoting abortive Bill; period of error in defective meter; discount or rebate for prompt payment and to large consumers; deduction under section 18 of the Finance Act, 1919, of one-sixth of the annual value for income-tax; liability to income-tax on costs of obtaining Special Order; disposal of effluent from gas-works; Widows, Orphans, and Old Age Contributory Pensions Act, 1925; services for public lamps; demand by local authority for information respecting items in company's accounts; insurance against loss of profits; right of water authority to prescribe distance at which gas mains should be laid from

water mains; income-tax—depreciation on gasholders; supply of gas to consumers by railway company; borrowing money up to one-half of share capital; creation of mortgages; supplying list of stockholders to applicant stockholder; payment of arrears of dividend; breaking-up a street not dedicated to the public use; rating of gas-works—deferred renewals; liability of gas company in respect of main laid over an electric cable; local authorities' requirements as to re-instatement of streets broken up; subscriptions to charitable institutions; dispute as to consulting engineer's charges; meter ceasing to register; public supply of electricity by unauthorized company; recovery of gas rents by civil action; erection of gas-works on new site—allowance for renewals of displaced plant; railway company's claim for demurrage in respect of coal wagons; dispute as to price of goods; damage by explosion—defective service pipe; damage to gas pipes through subsidence; guarantee to bank and Directors' indemnity.

The following members retire from the Committee, in accordance with Rule 12: Dr. Charles Carpenter, C.B.E. (Chairman), Mr. J. Ferguson Bell, Mr. Charles F. Botley, Mr. W. E. Caton, Mr. F. J. Bradfield, and Mr. H. A. Stibbs, all of whom, with the exception of Mr. Stibbs, offer themselves for re-election.

The Chairman, before proceeding to move the adoption of the report and accounts, and to give a review of the proceedings of the Association during the past year, expressed his personal regret at the Chairman's absence, and its cause; and at his suggestion it was agreed to send a telegram to Dr. Carpenter voicing the sympathy of the members, and wishing him a speedy recovery.

Satisfactory Financial Position.

The Chairman then proceeded: From the report, it will be seen that our subscriptions, donations, and interest from War Loan for the year represented £566, less ascertained expenditure £431 9s. 4d., leaving a surplus for the year of £134 10s. 8d. Our assets consist of £1450 of 5 p.ct. War Loan, at a cost of £1377 10s.; cash at bank, £622 16s. 5d.; and cash in hand, £6 0s. 1d.—making a total of £2006 6s. 6d. The Committee at their last meeting decided that £250 of the bank balance should be invested in 5 p.ct. War Loan, 1929-47. This has been done, making the Association's total holding of this stock £1700. All the subscriptions for the year 1925 which were in arrear have been paid; and of the 1926 subscriptions there remains now outstanding but £12 12s. You will agree that our finances are in a satisfactory condition, having regard to the comparatively modest subscriptions we receive from our members.

While on this point, I would like to take the opportunity of mentioning that during the year the attention of your Committee was called to the fact that some of the member-companies had increased their authorized capital since they first joined the Association. It may not be within the knowledge of all members that our subscriptions are based on the authorized capital of the Company; and the following is the scale:

Where the authorized capital of a company

	£	s.	d.
Does not exceed £5000	0	10	6
Exceeds £5,000 and does not exceed £10,000 . .	1	1	0
,, £10,000 ,, ,, ,, ,, £50,000 . .	2	2	0
,, £50,000 ,, ,, ,, ,, £100,000 . .	3	3	0
,, £100,000 ,, ,, ,, ,, £500,000 . .	5	5	0
,, £500,000 ,, ,, ,, ,, £1,000,000 . .	10	10	0
,, £1,000,000, the annual subscription shall be optional, provided that no such company shall subscribe less than £10 10s. per annum.			

So that it is easily understood that gas undertakings who are frequently increasing their capital are liable to a higher subscription. A number of our members promptly responded, and have paid increased amounts, which has had the effect of enlarging our income by more than 10 p.ct.

Importance of Clean Coal.

The Chairman attended before the Commission, and gave his views on the coal question as affecting gas companies. Dr. Carpenter made a strong point of the collieries turning out clean coal for gas-making purposes; and it is hoped that when the coal industry has got into stride, it will endeavour to limit the amount of ash content in the coal. In the case of one company who, during the last eighteen months, made contracts with respect to the limitation of ash content, a clause was settled something on the following lines:

(1) Sellers warrant the coal to contain not more than 6 p.ct. ash. In the event of the coal showing over 7 p.ct. ash, and not more than 10 p.ct. ash, the sellers agree to a deduction from the price at the rate of 3d. per ton per 1 p.ct. of excess of over 6 p.ct. In the event of the coal showing less than 5 p.ct. ash, the buyers agree to pay the sellers an addition to the price at the rate of 3d. per ton per 1 p.ct. below the 6 p.ct. The percentage is to be reckoned to the nearest ½d. per ton.

(2) The buyers to take fair average samples of contract coal daily, and, after carefully quartering the total samples taken, to make an analysis each week, the result of such analysis to be communicated to the sellers.

(3) The sellers to have the option of taking independent samples to be analyzed at their discretion.

(4) The unused balance of samples to be retained by the buyers for a period of . . . . . weeks after notification of the analysis to the sellers. If analysis is challenged by the sellers, further samples shall be taken by the sellers and buyers and analyzed respectively by the buyers and by a qualified analyst appointed by the sellers; the average of the two analyses being taken as the final analysis of the sample in question.

(5) Should any weekly consignment show an average of more than 10 p.ct. ash, such consignment is not to be considered as a delivery against the contract, but to be regarded as offered for sale at a price to be arranged between the parties, or, failing arrangement, to be removed by the sellers at their expense.

(6) Reductions or increases of price on result of analysis to be settled monthly.

Although, of course, colliery owners do not like this sort of restriction, the time has arrived when statutory gas undertakings, who are subject to the most stringent obligations in regard to purity, quality, and pressure, should receive a dependable and clean raw material. I know that in some of the coalfields the ash content ranges anywhere between 15 and 25 p.ct. In those cases they will have to "take a back seat" when competition becomes normal; for no gas administrator would think of purchasing, except at a huge discount, coal which contains so much incombustible matter, and involves so much unproductive expense in handling and use of extra plant.

The Coal Strike.

While on this point, I should like to make reference to the unfortunate upheaval which has taken place. The general strike was one of the greatest mistakes made in the labour world; but it indisputably proved that the gas industry was sound to the core, and I, personally, know of no outstanding case where essential men left their work. Then, simultaneously with the commencement of the general strike, came the coal strike, which has continued now for over 28 weeks. One "cannot make omelettes without breaking eggs," nor can a coal strike continue so long without involving great expense; but I am sure our consumers have not objected to what the gas industry has had to do in the way of increased charges for gas to pay the high prices of foreign coal. The gas industry has, while acting as collectors of money from the consumers for America and the Continent, at the same time been the backbone of this country during the great coal stoppage, and has proved once more how well gas can serve the public, as was the case during the strike of 1921, and throughout the great war. The public are always forgiven their very short memories; but we do hope when the time comes—and it is coming—for consideration of the gas industry's policy of consolidation, that there will be a generous support for the freeing of the industry from those conditions which are prejudicial.

Electricity.

I am now going to touch electricity. This Association has closely followed the progress of the Government's proposals, right down to the Committee stage in the House of Commons on Nov. 9, and until the third reading last week. It looks like the electricity industry being subsidized by the Government. It has been authoritatively stated that the Government's credit is not like a talent enclosed in a napkin, but is going to be used for the purpose of raising over 30 millions of money to back the electrical business—largely to facilitate competition with the old-established gas industry. What, then, is the position of our industry—particularly the gas companies? They have got seriously to think. When the present moment, which is somewhat overshadowed by our adverse industrial conditions, passes away, and the true values of the various companies exhibited, there must necessarily be a settled policy in regard to consolidation of interests to meet the competition which is looming. The Committee of your Association are fully alive to this important question; and they will from time to time be pleased to assist and advise their members.

Stabilization of Therm Prices.

So I get down to the following clause in the report, as regards the stabilization of therm prices:

> An important question raised by the Vice-Chairman was the expediency of making representations to the Board of Trade with a view to securing the stabilization of therm prices. A valuable memorandum on the subject, prepared by Mr. G. W. Anderson, was laid before the Committee; and, at the Chairman's request, Mr. E. Campbell Cooper, of the firm of Messrs. R. W. Cooper & Sons, Parliamentary Agents, advised the Committee as to the procedure which the Association could adopt. This matter is still receiving the attention of the Committee.

Here, again, this point is very much wrapped-up in the general policy which must be constructed in the future. Certain gas companies have had difficulty in raising ordinary capital because of the uncertainty of the standard price. It would be invidious to name any particular one; but I have in mind a case where new capital was raised at a premium, and a year or so after that particular stock stood at a discount of about 13 points. In another case, I know of a company where it is impossible to raise sliding-scale capital, owing to the uncertainty of the standard, because the public authorities make it their hobby to always be nibbling at the standard price. These things must be modified, and a strong policy pursued to draw this great industry together in one sound stabilized position. The Government cannot reasonably refuse to accede to our request, knowing that they are subsidizing our competitor, and backing him up with a Government credit to the extent of over 30 millions of pounds, while the gas industry spends hundreds of pounds fighting for decimal fractions of a penny in their standard price. A deputation interviewed the Director of Gas Administration with regard to the introduction of basic prices in Special Orders; but up to the present no communication has been received from the Board of Trade, who are doubtless giving this very important point careful consideration.

Tax Free Debenture Stock.

Questions of importance have been submitted to the Income-Tax Sub-Committee, and many members have obtained valuable assistance. In one particular case, as mentioned in the report, holders of tax-free debenture stock could not recover income-tax, although they were not assessable. The case is as follows: The Gas Company in question passed a resolution in 1903 to issue debenture stock, empowering the Directors to issue it subject to such terms and conditions as they might think fit. The stock was duly issued; and it was stated in the prospectus that interest thereon would be paid free of income-tax. The interest warrants clearly stated that the payment was "at the rate of 5 p.ct. per annum, free of income-tax," and that the tax had been, or would be, accounted for to the proper official for the receipt of taxes. On the passing of the Finance Act, 1924, by section 33 of which dividends or interest warrants must have

annexed a statement showing, *inter alia*, "the gross amount which after deduction of the income-tax appropriate thereto corresponds to the net amount actually paid," the Company's Secretary wrote to the Secretary of Inland Revenue to ask whether the said section "applied equally to a debenture stock issued at a fixed rate of interest free of tax as to the dividends on an ordinary industrial security." He was informed that the section did apply equally in both cases. The Company then had fresh income-tax certificates printed, to accompany the interest warrants, in accordance with the requirements of the said section. Subsequently the local Inspector of Taxes applied for a copy of the resolution under which the debenture stock was issued, and later notified the Company that the agreement to pay the interest "free of tax" was void, and that future warrants must show the gross and net amount of the interest as the same amount, with no deduction of income-tax. The Board of Inland Revenue, on being again approached, wrote stating that their first letter (already referred to) had been written under a misapprehension, and that the Company must comply with the Inspector's requirements. It happened that the Trustees of the Company's Superannuation Fund held some of the debenture stock of the Company in question; and following the Board of Inland Revenue's second letter to the Company, the Inspector, in dealing with the repayment claim for 1925-26 made by the said Trustees, not only deducted the amount of tax claimed to have been deducted in respect of the fund's holding for that year, but also stated that "excessive repayment" had been made on previous claims, and that he proposed "to set-off the over repayment due for the year 1925-26."

The matter was then brought before the Income-Tax Sub-Committee of the Association; and with the consent of the Chairman (Dr. Carpenter), which was ratified by the Committee at their next meeting, they instructed the Association's Solicitors to prepare a case for the opinion of Sir Stanford London, C.B.E. Put shortly, Sir Stanford London's opinion was that as between the Gas Company and its debenture stockholders, the agreement to pay interest on the debenture stock tax free was void under Rule 23 (2) of the General Rules applicable to all schedules of the Income-Tax, 1918. The main question, however, in Sir Stanford's opinion, was whether or not the debenture holders had paid tax on their interest, so as to enable them to claim repayment thereof; and in this connection he stated that there was a clear distinction between interest on debentures and dividends on ordinary shares, because, if interest be paid free of tax, the tax is borne by the shareholders, who are a different body from the debenture holders. The view put forward on behalf of the debenture holders, that 5 p.ct. free of tax is equivalent to a higher rate less tax, had not been adopted by the Judges. The difficulty had been overcome in recent years by issuing debentures to carry interest "at such a rate per annum as, after deduction of income-tax, would leave a net rate of interest at 5 p.ct." In such case, the interest appearing in the accounts is a gross amount, and the tax on it is treated as a receipt from the shareholders. Finally, he stated that, in his opinion, the Trustees of the Superannuation Fund could not object to "the elimination of the interest on the said debentures," but that they should object to the deduction of the suggested over repayment for the preceding six years, as the claims were made in good faith, and the Trustees' action was, in effect, endorsed by the Board of Inland Revenue in their letter first referred to above.

Another matter with reference to taxation was dealt with in regard to the expenses arising out of the Association's assistance to the Horley District Gas Company; and fortunately the Secretary was able to obtain a withdrawal of this claim.

LAYING OF MAINS IN HIGHWAYS.

A most important subject has been in hand for some time past—namely, the settlement of a common clause for public utility undertakings in regard to mains and cables in highways. These bodies embrace gas, water, electricity, tramways and light railways, &c. This draft clause has, as recently as the 11th inst., been further considered by a Conjoint Conference of Public Utility Associations, and is not yet in final form. It will be a great help when such a clause has been settled and mutually agreed.

PERSONAL.

We are sorry indeed to lose our old friend Mr. A. A. Johnston from the Committee, after a membership of some fourteen years. As you are aware, the Brentford Gas Company has been absorbed by the Gas Light and Coke Company; hence Mr. Johnston's withdrawal. We are happy to say that Mr. Johnston is willing to accept a nomination as a Vice-President; and in that capacity he could be heartily re-welcomed. To fill the Committee vacancy caused by Mr. Johnston's resignation, the Committee invited Mr. W. E. Caton, General Manager and Engineer of the Oxford Gas Light and Coke Company; and Mr. R. J. Auckland has been appointed to fill Mr. Johnston's place on the National Gas Council's Central Executive Board, as one of this Association's representatives. To the Committee's great regret, Mr. H. A. Stibbs, who has been a member of the Committee since 1917, and who retires this year under Rule 12, finds it difficult to attend meetings of the Committee, and has consequently stated that he would prefer that his name should not again go forward for re-election. The Committee unanimously resolved that Mr. A. W. Brookes, Secretary of the British Gas Light Company, should be asked to allow himself to be proposed as a member of the Committee in place of Mr. Stibbs.

SERVICES OF THE ASSOCIATION.

The Secretary, as in past years, has been consulted on a number of questions, of which a note is made in the report. It would probably be an inducement to more gas companies to join the Association if it were better realized that by becoming members, for a very modest annual subscription, companies got the advantage not only of the Secretary's advice and opinion on many parliamentary, legal, and general points, but of consideration by the Committee of difficult or important points—particularly on technical subjects. How varied these points are can be gathered by referring to the list of the principal matters set out in the report. The Association, while fully appreciating the future outlook in the gas industry, will, not only by itself, but in conjunction with other bodies, do its utmost to safeguard and further the great interests at stake. I have already mentioned the work that has been done by the Conjoint Conference of Public Utility Associations. Here is an object lesson of how various undertakings with different interests can find common ground on which to work; and, that being achieved, I have no fear whatever but that the different interests in the gas industry can join hands and fight a common cause.

I beg to move the adoption of the report of the Committee and the accounts for the year ended Sept. 30.

THE INTERESTS OF THE GAS INDUSTRY ARE THE INTERESTS OF THE COUNTRY.

Mr. C. F. BOTLEY (Hastings), in seconding the resolution, referred to the Chairman's clear explanation of the case relating to income-tax, and said that when matters of this importance could be handled it proved the utility of the Association. As to the Electricity Bill, the proceedings in Parliament gave one the impression that the Government had fully made up their minds upon the matter, and would listen to no argument which the Association might consider sound. The gas industry had been led to believe there would be no subsidy; but if this loan with the Government guarantee behind it was not a subsidy, he did not know what one might call it. And it was so unnecessary. Those who had seen the Electricity Commissioners' report for last year would agree that it furnished the strongest possible argument that the electricity undertakings were quite well able to carry on in the public interest without Government solicitude, or anything of that kind. The progress they were making was remarkable; and why the Government should take up one industry like this, and not another, it was difficult to say. There was, however, one development in connection with the electrical industry to which he wished to refer. Hitherto municipalities had had limited powers with regard to selling or hiring-out apparatus; but if the clause stood as at present, any authority, municipal or otherwise, under the new Act would have power to sell or hire out any electrical appliances. Electricity was to a great extent in the hands of municipalities; and it would be intolerable for the ratepayers if money could be expended without any regard to financial principles, and then the ratepayers (including the gas undertaking) be called upon to make up the deficit. The Association must continue to put forward every effort to protect the interests of the gas companies, which, after all, were the interests of the country. If the gas industry had not been representing the interests of the country during the last twenty-eight weeks, he did not think any industry ever had done so.

The report and accounts were unanimously adopted.

ELECTIONS.

On the proposition of the CHAIRMAN, seconded by Mr. W. PHILLIPS (Luton), the President (Sir J. Fortescue Flannery, Bart.) and the retiring Vice-Presidents (Messrs. Charles Hunt and Reginald G. Clarry, M.P.) were re-elected.

The CHAIRMAN proposed that Mr. A. A. Johnston be appointed a Vice-President. He said those of them who knew Mr. Johnston, as most of them did, realized what a charming colleague he had been as a member of the Committee for many years; and it was really a great loss to them that he had been obliged to withdraw.

The motion was seconded by Mr. W. F. WHITTAKER (Grays and Tilbury), and unanimously agreed to.

Thereafter the retiring members of the Committee, with the exception of Mr. H. A. Stibbs, were re-appointed—namely, Dr. Charles Carpenter and Messrs. J. Ferguson Bell, Charles F. Botley, W. E. Caton, and F. J. Bradfield—on the proposition of Mr. G. ANDERSON, seconded by Mr. A. W. BROOKES.

The CHAIRMAN proposed the election of Mr. A. W. Brookes (British Gas Light Company) as a member of the Committee, in place of Mr. Stibbs. He thought they were very fortunate in securing the services of Mr. Brookes, who would be of considerable assistance to them in their work.

Mr. DOUGLAS H. HELPS (Reading) seconded the appointment, which was agreed to, and acknowledged by Mr. BROOKES.

The HON. AUDITOR (Mr. W. A. Scott, F.C.A.) was re-appointed, on the motion of Mr. G. W. WILLMOTT (Wimbledon), seconded by Mr. R. J. AUCKLAND (Cardiff).

SERVICES RENDERED.

The CHAIRMAN proposed a hearty vote of thanks to the Secretary for his work during the past year. During the many years he had been on the Committee he had always found Mr. Cooper zealous in his work and invaluable in his advice. His wide experience had at all times been extremely useful in guiding the Committee. He included in the vote Mr. Campbell Cooper (who had also rendered great service to the Association) and the Assistant Secretary.

Mr. BOTLEY, in seconding, cordially endorsed all that the Chairman had said.

Mr. F. E. COOPER, acknowledging the vote, said he could not help thinking that if the different members of the Association would interest themselves more in it, and make known to non-members how much assistance they could get by joining, at very small cost, a large number would come in.

COMBINED GAS AND ELECTRICITY SUPPLIES.

Mr. CAMPBELL COOPER, who also returned thanks, said that with Mr. Clarry's assistance a clause had been inserted in the Electricity Bill which had enabled a gas company who had promoted an Order for electricity powers, and which Order had been rejected by the Electricity Commissioners, to go past them and appeal to the Ministry of Transport. What surprised him was that so few gas companies had availed themselves of the opportunity to secure powers to distribute electricity. Mr. Clarry had no difficulty in satisfying Parliament that it was a very proper thing for gas companies to have such powers. There must be many places where a gas company operated, but where

there was no electricity scheme at work. Another point was that great hardship was suffered by statutory companies not having a vote for municipal purposes in those cases where a municipal authority were promoting a Bill at the cost of the ratepayers. He did not know whether the Association had ever made representations to the Government on this matter.

The CHAIRMAN remarked that they had not had Mr. Clarry's Act very long; and in consequence of the Government Bill, the electrical industry was more or less in a state of flux. When the smaller places to which Mr. Campbell Cooper had referred saw exactly how they would be situated, no doubt they would come forward.

MINIMUM DIVIDENDS.

Mr. BOTLEY proposed a vote of thanks to the Chairman, who, he said, had always taken the greatest possible interest in the Association. With the South Metropolitan and Gas Light and Coke basic dividends, and the legislation that was foreshadowed, he thought they might anticipate with confidence that recognition would be made of the principle that shareholders were entitled to a minimum dividend.

Mr. C. M. D. BELTON (Shrewsbury) seconded this, with the remark that Mr. Edwards had given them a comprehensive survey of the activities of the Association, and had shown how closely in touch he was with everything that concerned it.

The CHAIRMAN, acknowledging the vote, said he thought it was far better to be apprehensive, and look ahead so as to meet one's difficulties in good time. He had served for forty years in the gas industry, and had seen many changes. He believed the future was a bright one; but it was not going to be a future for idle men. Competition was going to be very keen. No doubt Parliament and the Board of Trade would always give them their best consideration; but they must remember that, unless they put their case forward, nothing would be likely to be done for them.

EXPLOSION AT THE INGATESTONE GAS-WORKS.

Last Tuesday an accident occurred at the Ingatestone Gas-Works, involving the death of two men, injuries to a third, and shock and bruises to several others. The men killed were J. W. Griffin, Works Superintendent, and W. J. March, Works Foreman.

The Ingatestone Gas-Works were taken over this year by the Brentwood Gas Company, and considerable extension and alterations have been carried out. Recently a large station meter was installed. The installation of the meter had practically been completed, and the men engaged in the work were standing round, on Tuesday afternoon, when an explosion occurred; the meter apparently bursting, and wrecking the building. Two men were caught by the full force of the explosion, and received terrible injuries; these being Walter March, who was instantly killed, and John Griffin, who died on arrival at the Chelmsford Hospital. A workman, named William Ellis, received injuries to the head, and several others sustained shock and bruises. Mr. W. S. Venner, the Engineer and Manager of the Brentwood Gas Company, has been ill in bed for nearly a month, and has not yet had an opportunity of inspecting the damage at Ingatestone, and has thus been unable to form any theory as to how the accident occurred.

DISCHARGE OF EFFLUENT.

Settlement of Libel Action at Aldershot.

A statement has been issued by the Aldershot Borough Council setting forth the settlement arrived at of an action taken by the Aldershot Gas, Water, and District Lighting Company against the Council and the Town Clerk respecting a statement regarding the Company in the report of the Health Committee dated May 21.

The Council and the Town Clerk affirm that the statement was not correct, withdraw it unreservedly, and apologise to the Company for having made it.

On Dec. 3, 1924, an agreement was entered into between the Borough Council and the Company, stating conditions under which the Company were at liberty to discharge effluent into the Corporation's sewers.

During January, February, March, April, and May this year, tests were made by a representative of the Council, but no notice was given to the Company of the intention to make any test.

The agenda for the public meeting of the Council held on June 2 contained the report of the Health Committee, the concluding words of which contained an allegation that the Company had broken the terms of the agreement of Dec. 3, 1924. The Company consulted their solicitors, who wrote to the Town Clerk calling attention to the alleged libel, and informing him that they had advised the Company to issue writs.

The result of ensuing correspondence was that the "Aldershot Borough Council and the Town Clerk hereby publicly affirm that the statement in the report of the Health Committee dated May 21 was not correct. They unreservedly withdraw the said statement, and regret having made it, and apologise to the Company therefor."

Staindrop Gas Company.—At the annual meeting of the Staindrop Gas Lighting and Heating Company, Ltd., it was reported that the result of the year's business had been satisfactory, and a normal supply of gas had been maintained during the coal strike. There had been an increase in the number of consumers, and in the gas sales. Owing to the present cost of coal, the recommendation of the Directors to make the charge of gas 10s. per 1000 c.ft. net was adopted. A dividend of 5 p.ct., free of tax, was declared. It was stated that some structural alterations to the plant were necessary to cope with the increasing manufacture of gas, and that the Directors were arranging to get out a scheme.

INCREASES IN THE PRICE OF GAS.

The Airdrie Town Council announce a further increase of 9d. per 1000 c.ft.

The Ardrossan Town Council have added a further 10d. to the price, which makes a total of 1s. 3d. since the strike started. The price is now 6s. 5½d. per 1000 c.ft.

The Bridge of Allan Town Council have raised the price from 1s. 8d. to 1s. 11d. per therm.

At Callander the charge has been increased from 8s. 4d. to 10s. per 1000 c.ft.

The Carnoustie Town Council have agreed to a recommendation of the Gas Committee that the price be increased by 1s. 0½d. per 1000 c.ft. for ordinary and slot meters.

The price at Falkirk has been increased by 0·7d. per therm.

By a very small majority, the Halifax Corporation Gas Committee have decided to ask the Town Council to approve a second advance of 12½ p.ct. in the price of gas, to operate at the beginning of December.

The Kinross and Milnathort Gas Light Company, Ltd., have increased the price as follows: For lighting, 7s. 8½d. per 1000 c.ft.; for cooking, 7s. 6d.; for industrial purposes, 6s.

At Perth, the price has been raised by 1s. 3d. per 1000 c.ft. The new price is 5s. 9d.

PROPOSED SCIENCE EXHIBITION AT HASTINGS.

A suggestion that a science exhibition should be held in Hastings next year was put forward by the Mayor (Councillor D. S. Dymond) at the annual prize distribution of the Hastings Municipal School of Science, which took place at the Town Hall on Nov. 10.

Mr. C. F. BOTLEY, Engineer and General Manager of the Hastings and St. Leonards Gas Company, gave a brief lecture, illustrated with lantern slides, on the constructional principles involved in the erection of a gasholder. The various stages were shown, from the preliminary excavation for the holder to its completion.

The CHAIRMAN (Mr. J. Macer Wright, J.P.) moved a vote of thanks to Mr. Botley, and remarked that he could speak with knowledge of Mr. Botley's faithful service to the Company of which he had been Manager and Engineer for many years.

The MAYOR seconded, and said that on a previous occasion Mr. Botley had addressed the school on chemical problems, and he then proved himself a great chemist. That evening he had given a practical address on constructional engineering, and had proved himself a great constructional engineer. But their thanks were due to Mr. Botley from another aspect, since by such an address, given in simple language, he had helped to popularize science and to make them realize how much their daily life depended upon science. Probably all of them had been to the British Empire Exhibition, and had seen the scientific exhibits shown in the Government building. There had been scientific exhibitions in provincial towns, including Eastbourne; and what Eastbourne could do, Hastings could do. He was certain that the School of Science, aided by people like Mr. Botley, could hold an exhibition which would go far to popularize science in the town. Perhaps in the spring or summer they might be able to do something on the lines suggested.

The motion was carried with applause.

Mr. BOTLEY, in his reply said there never was a time in the history of the country when people were so alive to the need for research.

A "NEW" BINDER FOR FUEL BRIQUETTING.

We have received the following mysterious communication regarding a new binder for briquetting purposes; but, as will be seen, no information is vouchsafed as to its constitution:

"Despite the many attempts to produce a suitable adhesive, the only successful method (from a commercial point of view), so far, is the medium soft gas tar pitch. The pros and cons of this method are well known; and as the latter outweigh the former, it is obvious why such steady efforts are being made to find a substitute. It would appear that something of this nature will shortly be marketed, after severe tests, carrying with it a well-known engineer's report.

"It is considerably cheaper than pitch; and the prices of the materials used are not subject to the constant changes that occur in the pitch market. Moreover, the ingredients are plentiful, and easy to obtain. There is often a great scarcity of pitch suitable for fuel briquetting, with consequent high prices. Owing to the great consumption of tar in road making, and to the existing strike, during which little (if any) pitch has been made, pitch has risen by more than 400 p.ct. in price during the last twelve months.

"The binder is tough and rubbery, and when powdered will remain in that condition much longer than powdered pitch; and fine dust clouds are eliminated. The melting point is higher than that of pitch, although a high temperature is not necessary; and superheated steam is not used in mixing. The fuel sets-out quickly, and can be stacked and shipped as soon as manufactured.

"The fuel made with the binder is not smokeless; but it is less so by three-fourths than pitch-bound fuel. It is waterproof and weatherproof, clean to handle, and does not soften on the fire. The binder is equally good for anthracite, small coal, coke breeze, lignites, and charcoal, for which pitch is not a good binder. The binder has special qualities that make it quite valuable for processes in connection with road making, slab flooring, &c. All experiments to date go to show that the binder is a marked improvement on pitch in many directions.

"In view of all this, the discovery should be of great interest to the patent fuel trade."

NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

Pending the resumption of negotiations with the men, the market this week-end is in a state of indecision. Prices for forward delivery are practically impossible to obtain. Local gas-works are getting Durham coal at prices round about 45s. on rail, and industrial concerns are paying the same figure. This has, up to the present, absorbed the output, but, with the quantity rapidly increasing, the ban has been lifted from coastwise shipments for public utility purposes, though bunkers are not yet obtainable to carry them. It remains to be seen how soon there is any surplus available, and no prices have as yet been mentioned for such shipments.

Though collieries generally are unwilling to quote forward, 27s. 6d. f.o.b. seems to be about the general idea for the first month for good qualities, 25s. for two months, and 20s. for the year.

COAL TRADE IN THE MIDLANDS.

From Our Local Correspondent.

Rather more gas coal is forthcoming from pits at home. Opposition is offered to the prices which are demanded by some of the collieries which do not admit that the arrangement of limitation of selling rates extends to supplies to the gas-works. As much as 57s. 6d. at pit-head was asked on the market at Birmingham for unscreened Derbyshire coal. This price—though some consumers and middlemen refuse to entertain it—is so much less than reliable gas-making coal can be imported for that it is not likely to want for buyers. Moreover, some of the gas undertakings are practically defenceless in the matter till much larger supplies are available. The majority have safeguarded themselves up to a point; and in view of the intractable attitude of large numbers of the miners in coalfields from which they ordinarily derive supplies, there is naturally anxiety to make the forward position more secure. With Westphalian coal in ill favour and keen competition for eastern going tonnage in the Atlantic, stringency remains the dominant note of the market.

There is some slight relief in regard to supplies of coal and slack for manufacturing purposes. It does scarcely anything to solve the problem of the iron and steel trade, however.

Furnace men are as much in the dark as ever respecting coke, and those branches which consume coal cannot rely on continuity of supplies, so that little is done to bring idle plants into operation.

In the factories there is a fair aggregate of employment, and, thanks to latitude in the administration of the control, night shifts are being worked in exceptional instances.

The new regulations as to the rationing of household coal do not seem to make much difference in practice.

GAS REGULATION ACT APPLICATIONS.

AMENDING ORDERS.

Bognor Gas Light and Coke Company.

To substitute for existing standard prices varying from 17d. to 18·2d. per therm, standard prices ranging from 18·05d. to 19·25d., with consequent alterations in maximum prices for public lighting.

Budleigh Salterton Urban District Council.

The Board of Trade give notice that the Council have made application for an Amending Order revising the powers of charging of the Budleigh Salterton Gas Company, Ltd., by reducing the maximum price authorized by that Order.

Crowborough District Gas and Electricity Company.

To substitute for the existing standard price of 17·4d. per therm a standard price of 20·4d., until Sept. 30, 1927.

Newquay (Cornwall) Gas Company, Ltd.

To substitute for the maximum price of 14·4d. per therm a maximum price of 18·4d., until Dec. 31, 1927.

Wakefield Gas Light Company.

To substitute for the existing standard price of 11·8d. per therm a standard price of 14·8d., until June 30, 1927.

GAS REGULATION ACT ORDERS.

We have received from the Director of Gas Administration a copy of the following Order made under section 1 of the Act.

Ossett Corporation.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 13d. per therm; and 0·6d. per therm shall be substituted for 3d. per 1000 c.ft. in paragraph (2) of section 23 (for protection of the Crigglestone Parish Council) of the Ossett Corporation Gas Act, 1900.

The Order came into force on Nov. 15.

Stealing Gas.—The Cowdenbeath Gas Company, Ltd., at Dunfermline Sheriff Court, charged two miners, Alexander Godsell and David Campbell, with having stolen gas for lighting and heating to the value of 3s. 6d. It appeared that, between Oct. 26 and Nov. 5, the service pipes of a prepayment meter were disconnected; a piece of gas tubing being used afterwards as a direct connection. Accused pleaded poor circumstances; and each was fined 10s., with the option of ten days' imprisonment.

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CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Nov.* 22.

Tar products generally continue firm. Pitch is a little quieter; buyers at the moment being inclined to await events in connection with the coal strike. The price, however, is steady at about 200s. per ton in bulk at makers' works.

Creosote maintains its firm tone, and is called about 9d. per gallon in bulk f.o.b.

Tar spirits also are firm; pure benzole being about 3s. per gallon, pure toluole about 3s. to 3s. 3d. per gallon, and 95/160 solvent naphtha about 2s. 1d. to 2s. 2d. per gallon.

Tar Products in the Provinces.

Nov. 22.

The average values of gas-works products during the week were: Gas-works tar, 116s. to 121s. Pitch, East Coast, 186s. 6d. to 190s. f.o.b. West Coast—Manchester, 180s. to 182s. 6d.; Liverpool, 182s. 6d. to 185s.; Clyde, 186s. to 188s. Benzole, 90 p.ct., North, 1s. 11d. to 2s.; crude, 65 p.ct. at 120° C., 1s. 4d. to 1s. 5d., naked at makers' works; 50-90 p.ct., naked, North, 1s. 11d. to 2s. Toluole, naked, North, 1s. 11d. to 2s. nominal. Coal-tar crude naphtha, in bulk, 9d. to 9¼d. Solvent naphtha, naked, North, 1s. 9d. to 1s. 10d. Heavy naphtha, North, 1s. 1d. to 1s. 2d. Creosote, in bulk, North, liquid, 8½d. to 9d.; salty, 8d. to 8¼d.; Scotland, 7¾d. to 8¼d. Heavy oils, in bulk, North, 7¼d. to 7¾d. Carbolic acid, 60 p.ct., 1s. 5d. to 1s. 6d. prompt. Naphthalene, £11 to £14; salts, 90s. to 100s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

TRADE NOTES.

Gas Exhausting and Compressing Plants.

The Bryan Donkin Company, Ltd., of Chesterfield, have published a profusely illustrated booklet describing their various gas exhausting and compressing plant. It is an excellent production.

Lighting, Heating, and Cooking by Gas.

A copy is to hand of a new edition of the catalogue of Messrs. Falk, Stadelmann, & Co., Ltd., 83-93, Farringdon Road, London, E.C., which describes and illustrates their extensive range of fittings and apparatus for meeting requirements for lighting, heating, and cooking by gas. There are shown solid-drawn tube lighting fittings of all sizes and styles, together with silk, glass, and other shades to meet every taste. An equally varied assortment is to be found of incandescent gas burners and lamps, for indoor and outdoor lighting, as well as particulars of the firm's well-known mantles. A number of patterns of cookers, fires, boilers, &c., are also described.

CONTRACTS OPEN.

Retorts, Firebricks, &c.

The City of Salford are inviting tenders for the supply of retorts, firebricks, &c. [See advert. on p. 519.]

Lecture on Geysers and Califonts.—On Thursday evening, Nov. 18, Mr. George Ewart, accompanied by Mr. A. H. Thomas, of Messrs. Ewart & Son, gave an interesting lecture at the central showrooms of the Leamington Priors Gas Company, on geysers and califonts. Mr. Ewart explained the working of different kinds of geysers by means of diagrams and actual apparatus cut through the middle, and exhibited as well a model made fifty years ago of one of the early types of Ewart's geysers. The lecture was well attended by representatives of local plumbers and ironmongers, as well as by employees of Leamington, Warwick, and Kenilworth Gas Companies.

Oriental Gas Company, Ltd.—At the annual meeting to-day, the Directors will report that, for the year ended June 30, the gross revenue from sale of gas and rentals shows an increase of £3834. The receipts from coke, breeze, and tar are considerably below those of the previous year, due to the fall in market prices; but the receipt from sulphate is higher. There has been an increased profit on exchange of £1215; but there is a decrease in the gross receipts from all sources, excluding exchange, of £4260. There has been an increase in the sale of gas of 4·2 p.ct., and a satisfactory increase in the number of gas appliances sold and hired. They will recommend the payment of a dividend at the rate of 4½ p.ct., less income-tax, making, with the interim dividend of 3½ p.ct., less tax, paid in May last, a total of 8 p.ct., less tax, for the year.

Gas Tube Fatality at Golder's Green.—A verdict of "Death by misadventure, caused by gas escaping from a defective rubber tube," was returned at an inquest on the bodies of two women, who were found dead in a room which they rented in Portsdown Avenue, Golder's Green. There was a small portable heating stove in the room; and this had been connected by the landlord to the gas supply by a rubber tube. When the bodies were discovered, the tap of the stove was not turned on; but the rubber tube was disconnected and broken near the top. When put on the gas supply pipe, the tubing fitted perfectly. Mr. Ernest Sutton (of the Gas Light and Coke Company) said that fixing a gas stove with a rubber tube was a dangerous practice. The tube might easily split on being pressed over the nozzle. The Coroner remarked that there was no doubt the two women were in financial difficulties; but there had been evidence to prove that they managed to get over their troubles, and were out of debt. There appeared to be every reason for them to cease being depressed. The landlord, in putting rubber tubing on to the stove, was, in effect, installing a dangerous weapon in the room.

A Meritorious Service Medal.

One of the events of last month's convention of the American Gas Association was the presentation of their Meritorious Service Medal, "in recognition of prompt, meritorious, and outstanding intelligence and bravery in the saving of life and property in the Santa Barbara earthquake," to Mr. Henry F. Ketz, plant engineer, of the Southern Counties Gas Company, who serve this Californian town. At the time of the earthquake—6.45 a.m., on June 29, 1925—the gas plant had started operations for the day, and was in charge of Mr. Ketz. Immediately after the heaviest shock, and while tremors were still continuing, he noticed that the differential hand on the orifice meter measuring the gas sent out to the city had gone off the edge of the chart—indicating an instantaneous and tremendous increase in the rate of flow. Realizing immediately that this increase in flow must be due to breaks in the mains, he at once closed down the main valve on the pipeline leading into the city. Gas was thus shut off two or three minutes after the earthquake. It was felt that this intelligent action saved the city from a disastrous fire, for the pressure in the water mains, due to a break, was very low for several hours after the occurrence; and this action was carried out at a moment when the law of self-preservation prompted everyone to flee into the open.

Cookery Competition at York.—The annual gas cookery competition promoted by the York Gas Company reached its final stage recently, when 22 schoolgirls, each the best cook in her own school or class, competed for handsome prizes handed to the winners by the Lady Mayoress (Mrs. Oscar Rowntree). Olive Wardell, aged 13, of St. Barnabas School, was the champion of the city.

Churnet Valley Gas Company, Ltd.—The Directors report that for the year ended Sept. 30 the revenue account shows a profit of £1468; and with the addition of the amount brought forward, and the deduction of interest charges, there is for disposal a sum of £1799. A dividend at the rate of 5 p.ct. per annum is recommended, together with the writing-off of £250 from meters, stoves, and fittings account; and this will leave £749 to be carried forward.

Fatality at the Saltley Gas-Works.—An accident involving the death of Bernard Leslie Taylor, a member of a firm of contractors, and injury to a workman named Gavaghan, due to the collapse of hoisting apparatus, occurred at the Saltley Gas-Works on Tuesday, Nov. 16. The inquest was held on the following day, when it was stated that the work was under the dead man's supervision. The accident was due to the breakage of one of the guy ropes, and part of the derrick struck deceased. A verdict of "Accidental death" was returned.

Low-Temperature Carbonisation, Ltd.—An issue at par of £150,000 of 8 p.ct. prior lien debenture stock is being made by Low-Temperature Carbonisation, Ltd., the total authorized share capital of which is £1,275,000, in 12,750,000 shares. Of these shares, 5,265,871 are issued and to be issued, 750,000 are reserved under option, and 6,734,129 are unissued. The debenture stock created is £300,000, and the amount issued and to be issued £284,841 16s. The debenture stock is redeemable at par on July 1, 1931, or earlier, at the option of the Company, at 110 p.ct.

Combined Gas and Electricity at Bungay.—Electricity is now being supplied from the Bungay Gas-Works; the plant for the purpose having recently been inaugurated. The gas which supplies the engines is made by two Tully plants, which have been erected in addition to the retorts. All the mains are overhead. The gas undertaking was purchased about twelve months ago by Dr. Purves, who recognizes that this combination of the two undertakings under one management tends to economy, and therefore to the cheapening of both gas and electricity. The Manager (Mr. E. E. Messenger) possesses an intimate knowledge of electricity undertakings, as well as gas-works.

On Nov. 5 two men were fatally hurt by an explosion in one of the retorts at the Odense Gas-Works. The explosion is attributed to bad-quality Continental coal.

The Blairgowrie Gas Light Company have announced that the gas supply will be shut off on week days from 9 to 11.30 a.m. and from 1 to 3.30 p.m., and on Sundays from 9.30 a.m. to 12.30 p.m., and from 1.30 to 3.30 p.m.

The Keighley Corporation Gas Committee recommend the Town Council to support the action of the Middleton Town Council in protesting to the Ministry of Mines against "the unjustifiably high price which is at present being charged for English coal."

In view of the serious financial position of the Hebden Bridge and Mytholmroyd Gas Board, owing to heavy expenses arising out of the coal dispute, the Board have decided to apply to the Ministry of Health for sanction to borrow £8000 for as long a period as will be allowed.

It has been decided to extend and improve the Skegness gas undertaking, at an estimated outlay of £16,685. The proposals embody an installation of continuous vertical retorts, with steam-driven hoist, sufficient for an output of 450,000 c.ft. of gas per day, with facilities for extension.

While engaged on the construction of a 2 million c.ft. holder at the Blackburn Corporation Gas-Works, five men had a remarkable escape from death. The structure is over 30 ft. high, and the top is reached by a tall ladder. The men were proceeding to work, on Nov. 17, and were not far from the top when the ladder snapped. The first workman clung to the trap door, and pulled himself up. The other four, however, were precipitated into the interior of the holder. All were hurt, and James Ormerod was removed to the infirmary suffering from fractures and other injuries.

STOCK MARKET REPORT.

THE optimism that prevailed on the Stock Exchange during the previous week was somewhat subdued last week; and notwithstanding the very definite lead given by the miners themselves by the increase in the number of men at work, investors allowed themselves to be influenced by the farcical "majority" voting. It is true there were other adverse factors—such as heavy selling of international securities from Paris, and reports of unsatisfactory results from industrial concerns; but with regard to the latter, it is gratifying to hear of substantial orders for work abroad being placed in England.

Gilt-edged stocks were quietly firm. Home Rails, other than "Districts," in which there was some profit-taking on the recent rise, continued in their uninteresting condition. London Stores on amalgamation rumours were very active; but the whole movement is looked upon as a pure gamble.

Among the new issues for the current week may be mentioned the issue of Newfoundland £1,027,300 5 p.c. bonds to bearer of £100 each to be offered at 99 p.c., and the Ealing Corporation 5 p.c. redeemable stock at the same price.

There is little to report on the Gas Market. The transactions were at slightly higher rates, and quotations were firm; but it will be seen from the table that there were only two variations on the week—Chester 5 p.c. ordinary rose 1 point to 89—94, and Newcastle and Gateshead consolidated ¾ to 71¾—72¼, both variations being at the local exchanges.

Attention is drawn to the consolidation by the Primitiva Gas Company of the Buenos Ayres redeemable debentures and the River Plate redeemable debentures into 4 p.c. consolidated debenture stock. The new stock is quoted on the London Exchange at 69—71. There is also inserted in the table for the first time the Colonial Gas Association, Ltd., ordinary £1 shares and 8 p.c. preference shares.

The following transactions were recorded during the week:

On Monday, Bournemouth 6 p.c. preference £11 4s. 3d., British 105½, Colonial 27s. 3d., European 6¾, 7, 7 1/16, Gas Light and Coke 83, 83¼, 83½, 83⅝, 84, 3½ p.c. 59¼, 4 p.c. preference 76, 3 p.c. debenture 58⅞, 59½, 60, North Middlesex 10 p.c. 158, Primitiva 12s. 10½d., 13s., 13s. 0¾d., 13s. 1½d., 13s. 3d., South Metropolitan 91¼, 91½, 92, 92¼, 3 p.c. debenture 59¼, 6½ p.c. debenture 100½. Supplementary prices, Montevideo 6 p.c. debenture 98¼.

On Tuesday, Bombay 21s., British 104½, 105½, Cape Town 7/-, Colonial 26s. 9d., 27s. 3d., 27s. 4½d., Continental Union 20, 20½, Croydon 97, 98, Gas Light and Coke 83⅜, 3½ p.c. 60, 4 p.c. preference 75½, 77, Imperial Continental 130, Primitiva 12s. 9d., 13s., 13s. 1½d., 13s. 3d., 13s. 4½d., 4 p.c. debenture (1911) 70½, South Metropolitan 91½, 91⅝, 92. Supplementary prices, Bournemouth 7 p.c. debenture 103½, Hastings 3½ p.c. debenture 64⅜.

On Wednesday, Alliance and Dublin 84, 84½, Colonial 26s. 9d., Croydon sliding-scale 97, maximum dividend 80, European 6⅞, Gas Light and Coke 83½, 83¾, 83⅞, 83/-, 4 p.c. preference 75½, 76, 3 p.c. debenture 59, Hastings 3½ p.c. 70, Imperial Continental 130, 130½, Montevideo 80½, Oriental 100, 101, Primitiva 12s. 9d., 12s. 10½d., 13s., 13s. 1½d., 13s. 3d., 4 p.c. consolidated debenture 69½, 70, 4 p.c. debenture (1911) 70½, 71, South Metropolitan 91¼, 91½, 92. Supplementary prices, Leatherhead 5½ p.c. debenture 99½, 100, Malta 2nd (7½ p.c. preference) 98s. 9d., 100s.

On Thursday, Alliance and Dublin 83½, Bombay 20s. 9d., 21s. 3d., Bournemouth 7 p.c. maximum 12¾, 6 p.c. preference 111⅝, Commercial 3 p.c. debenture 60, European 6⅞, Gas Light and Coke 83½, 83⅜, 83½, 83⅞, 84, 4 p.c. preference 76, 3 p.c. debenture 59, 60, Imperial Continental 130, Oriental 100½, Ottoman 8s., Primitiva 12s. 10½d., 12s. 11½d., 13s., 13s. 3d., South Metropolitan 92¼, 3 p.c. debenture 58⅝. Supplementary prices, Barnet 4 p.c. debenture 73½, Folkestone 75⅞, 76, Hong Kong 5 p.c. debentures 87, Southgate 7½ p.c. debenture 100½.

On Friday, Colonial 26s. 9d., Commercial 3 p.c. debenture 57, Croydon maximum dividend 80½, 81, European 6⅞, 6 1/16, Gas Light and Coke 83⅜, 84, Imperial Continental 130, Primitiva 12s. 9¾d., 12s. 10½d., South Metropolitan 91½, 92½, South Suburban 5 p.c. debenture 93½, Tottenham "B" 90¼. Supplementary prices, Hornsey 5 p.c. preference 85, Malta and Mediterranean 7 p.c. preference 98s. 9d.

In Lombard Street the rates for loans were identical with the rates for the previous week. By the Clearing Banks 4 p.c. was charged, but most other lenders lowered their charges to 3⅞ p.c. Fresh accommodation was available towards the close at 3½ p.c. Discount quotations were maintained, the Treasury Bill rate exerting a steadying influence. The average rate for the latter again showed a reduction of £4 15s. 5·83d. p.c. This is the lowest rate since Oct. 1, and is nearly 1s. 1d. p.c. below the previous week's rate.

The franc dominated the Foreign Exchange Market, and the rapid rise in value is causing great anxiety in Paris. The closing quotation on Friday was 131⅞; the rate touched 128 on Saturday; and closed at 130.

The Bank Rate is 5 p.c., to which it was raised from 4 p.c. on Dec. 3. Bankers' deposit rates are 3 p.c. The deposit rates of the discount houses are 3 p.c. at call and 3¼ p.c. at notice.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. Nov. 19.	Rise or Fall on week.	Transactions Lowest and Highest Prices.
£			% p.a.	% p.a.				
171,978	Stk.	Aug. 12	5	5	Aldershot 5 p.c. max. C.			
822,992	"	"	4	4	Do. 4 p.c. Pref.	72—75	..	..
1,551,868	"	Sept. 30	4	6½	Alliance & Dublin Ord.	65—70	..	..
374,000	"	July 8	6½	4	Do. 4 p.c. Deb.	88—88	..	..
300,000	1	Oct. 14	4	1/7⅞	Bombay, Ltd.	67—70	..	83½—84⅛
170,000	10	Aug. 26	1/7⅞	8½	Bournemouth 5 p.c.	1—1½	..	..
500,050	10	"	8½	8½	Do. B 7 p.c.	12—13	..	20/9—21/3
275,000	10	"	7	7	Do. Pref. 6 p.c.	12—13	..	..
50,000	Stk.	June 24	6	6	Do. 5 p.c. Deb.	11—12	..	12⅜
162,025	"	"	3	3	Do. 4 p.c. Deb.	54—57	..	11½—£11/1/3
214,740	"	Aug. 26	4	4	Brighton & Hove Orig.	74—77	..	..
244,200	"	"	12	12	Do. A Ord.	163—168	..	..
1,927,500	"	July 22	9	9	Bristol 5 p.c. max.	125—130	..	..
855,000	"	Sept. 30	5	5	British Ord.	85½—86¼a	..	..
100,000	"	June 24	7	8	Do. 7 p.c. Pref.	102—107	..	..
120,000	"	"	7	7	Do. 4 p.c. Red. Deb.	114—119	..	104½—105½
100,000	10	June 10	4	4	Cape Town, Ltd.	68—73	..	..
100,000	10	Oct. 28	6	8	Do. 4½ p.c. Pref.	7—8	..	..
150,000	Stk.	June 24	4½	4½	Do. 4½ p.c. Deb.	6—7	..	7⅞
626,860	"	July 22	4½	4½	Cardiff Con. Ord.	68—73	..	..
337,860	"	June 24	6	6	Do. 7½ p.c. Red. Deb.	94—97	..	..
157,150	"	Aug. 12	7½	7½	Chester 5 p.c. Ord.	99—102	..	..
79,185	1	Sept. 30	6¾	5	Colombo Ltd. Ord.	89—94b	+1	..
24,495	1	"	½/-	½/-	Do. 7 p.c. Pref.	27/—29/-	..	..
321,490	1	Oct. 14	1/4½	1/4½	Colonial Gas Assn. Ld. Ord.	20/—22/-	..	..
173,900	1	"	1/9⅜	1/7½	Do. 5 p.c. Pref.	21/—23/-	..	26/9—27/3
1,513,280	Stk.	Aug. 1	1/9⅜	1/7½	Commercial 4 p.c. Cap.	26/—28/-	..	..
560,000	"	"	5½	5½	Do. 3½ p.c. Cap.	77—80	..	..
475,000	"	"	5/3/4	5/3/4	Do. 3 p.c. Deb.	74—77	..	..
800,000	"	June 24	3	3	Continental Union, Ltd.	55—58	..	..
200,000	"	Sept. 30	½	½	Croydon sliding scale	27—32	..	57—60
737,150	"	"	7	7	Do. max. div.	96—99	..	29—29½
408,100	"	Aug. 12	6½	6½	Derby Con.	78—81	..	..
492,270	"	"	5	5	Do. Deb.	107—109e	..	97—98
55,000	"	Aug. 26	9	6	East Hull Ord. 5 p.c.	73—75e	..	80—81
209,000	"	June 24	4	4	Eastbourne 5 p.c. Deb.	84—87	..	..
50,000	"	Sept. 16	5	5	European, Ltd.	91—96	..	..
1,002,180	"	June 24	5	5	Gas Light & Coke 4 p.c. Ord.	6½—7⅛	..	..
12,788,960	10	Sept. 30	¼	12	Do. 3½ p.c. max.	83—85	..	..
2,600,000	Stk.	Aug. 12	4/17/4	5/1/4	Do. 4 p.c. Pref.	58—61	..	6⅞—7⅛
4,157,020	"	"	8½	8½	Do. 3 p.c. Con. Deb.	74—77	..	88—84
5,602,620	"	"	4	4	Do. 6 p.c. Br'tf'd Rd. Db.	100—105	..	59½—60
181,315	"	June 24	3	3	Do. 10 p.c. Bonds.	..	..	75½—77
180,000	"	"	—	6	Do. 7½ p.c. Ilford Deb.	..	..	58⅝—60
42,000	"	—	10	10	Hastings & St L. 5 p.c. Conv	87—92	..	..
82,500	"	—	7½	7½	Do. 3½ p.c. Conv.	66—71	..	..
258,740	"	Aug. 26	6¾	6¾	Hongkong & China, Ltd.	19—20	..	70
70,000	"	"	5¾	5¾	Hornsey Con. 3½ p.c.	69—71	..	..
173,200	10	Oct. 14	†10	†10	Imperial Continental Cap.	128—133*	..	..
1,976,000	Stk.	Sept. 16	5	5	Do. 3½ p.c. Red. Deb.	68—71	..	130—130½
226,170	"	Nov. 11	‡10	10	Liverpool 5 p.c. Ord.	92—97	..	..
235,242	"	Aug. 12	3½	3½	Do. 7 p.c. Red. Pref.	80—81b	..	..
2,127,340	"	Aug. 12	6½	6½	Maidstone 5 p.c. Cap.	102—105b	..	..
600,000	"	Aug. 12	5½	5½	Do. 3 p.c. Deb.	112—117	..	..
165,736	"	Sept. 30	7	7	Malta & Mediterranean	53—58	..	..
33,480	"	Aug. 26	8	9	Montevideo, Ltd.	5½—5⅝	..	..
75,000	"	June 24	8	8	Newcastle & Gateshead Con.	80—83	..	..
541,920	5	June 24	‡6	‡7	Do. 4 p.c. Pref.	71⅝—72¼d	..	80½
2,061,315	Stk.	May 20	‡4	‡6	Do. 3½ p.c. Deb.	73—74d	+¾	..
360,929	"	Aug. 12	5	5	North Middlesex 10 p.c.	68½—69d	..	..
529,705	"	"	4	4	Do. 7 p.c.	155—160	..	..
15,000	"	June 24	3½	3½	Oriental, Ltd.	109—114	..	158
91,580	"	Aug. 26	11½	11½	Plym'th & Ston'house 5 p.c.	97—102	..	..
300,000	"	"	8⅛	8⅛	Portsm'th Con. Stk. 4 p.c. Std.	108—113	..	100—101
188,120	"	May 6	9	8⅛	Do. 5 p.c. max.	102—107	..	..
414,500	"	June 24	7½	7	Primitiva Ord.	73—81	..	..
236,732	"	Aug. 26	—	7½	Do. 4 p.c. Red. Deb.	12/6—13/6	..	..
9,389,909	"	"	—	7/4/0	Do. 4 p.c. Red. Deb. 1911	84—86	..	12/9—13/4½
382,200	1	June 1	—	5/0/0	Do. 4 p.c. Cons. Deb.	69—71	..	..
600,000	100	June 24	4	—	San Paulo 6 p.c. Pref.	69—71	..	70¼—71
434,963	Stk.	July 22	4	4	Do. 5 p.c. Red. Deb.	7½—8	..	69½—70
160,000	"	—	—	4	Sheffield A	46—49	..	..
125,000	10	Sept. 30	6	—	Do. B	97—99e	..	..
270,000	50	July 1	6	6	Do. C	97—99e	..	..
419,968	Stk.	Sept. 16	6	5	South African	97—99e	..	..
1,047,000	"	"	6	5½	South Met. Ord.	5—7	..	..
90,000	"	"	6	5½	Do. 3 p.c. Deb.	90½—92½	..	..
6,602,895	10	June 11	4	5½	Do. 6½ p.c. Red. Db.	57—60	..	91¼—92½
1,895,445	Stk.	Aug. 12	7	—	South Shields Con.	100—102	..	58⅝—59½
784,000	"	July 8	3	5	South Suburban Ord. 5 p.c.	114—116d	..	100½
91,500	"	Sept. 16	3	3	Do. 5 p.c. Deb.	96—99	..	..
1,187,795	"	Aug. 12	6½	6½	South'mpton Ord. 5 p.c. max.	92—95	..	..
368,837	"	Aug. 12	8½	8½	Do. 4 p.c. Deb.	76—78	..	93½
647,740	"	June 24	6½	6½	Swansea 7 p.c. Red. Pref.	68—73	..	..
121,275	"	Oct. 14	5	5	Do. 6½ p.c. Red. Deb.	100—102	..	..
250,000	"	June 24	5	5	Tottenham District A 5 p.c.	100—102	..	..
200,000	"	Aug. 26	4	4	Do. B 3½ p.c.	105—110	..	..
120,000	"	June 24	7	7	Do. 5½ p.c. Pref.	88—91	..	..
882,275	"	July 22	6½	6½	Do. 4 p.c. Deb.	99—101	..	91½
150,000	"	"	7½	7½	Tynemouth Con. and New	73—76	..	..
181,355	"	"	5½	6½	Uxbridge, Maidenhead, & Wycombe 5 p.c.	67—68d	..	..
258,251	"	June 10	5½	5½	Do. 5 p.c. pref.	85—90	..	..
	"	Aug. 26	4	4	Do. 5 p.c. Maidenh'd	80—85	..	..
			5	5	Wandsworth, Wimbledon, and Epsom—	85—90	..	..
197,294		Aug. 26	6⅝	6½	Wandsworth A 5 p.c.	122—127	..	..
88,330	"	"	5	5	Do. B 3½ p.c.	102—107	..	..
91,800	"	"	6½	6½	Do. C and New	88—93	..	..
30,000	"	July 8	8½	8½	Wimbledon 5 p.c.	98—103	..	..
355,636	"	"	7	7	Epsom 5 p.c.	104—109	..	..
412,450	"	"	5/19/0	5/19/0	3 p.c. Deb.	54—57	..	..
852,000	"	"	6⅝	6⅝				
96,000	"	"	7½	7½				
88,416	"	June 24	3	3				

Quotations at:—a.—Bristol. b.—Liverpool. c.—Nottingham. d.—Newcastle. e.—Sheffield. *Ex. div. † Paid free of income-tax. ‡ Plus 8½ p.c. p.a. special dividend. § For year.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

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